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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 87)

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NASA SP-7011 (87)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 87)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Scientific and Technical Information System during February, 1971.

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 349 reports, articles, and other documents announced during January 1971 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, irregular supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations and abstracts are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1971 Supplements.

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All publications abstracted in this bibliography are available to the public through the sources as indicated in the *STAR Entries* and *IAA Entries* sections. It is suggested that the bibliography user contact his own library or other local libraries prior to ordering any publication inasmuch as many of the documents have been widely distributed by the issuing agencies, especially NASA. A listing of public collections of NASA documents is included on the inside back cover.

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TABLE OF CONTENTS

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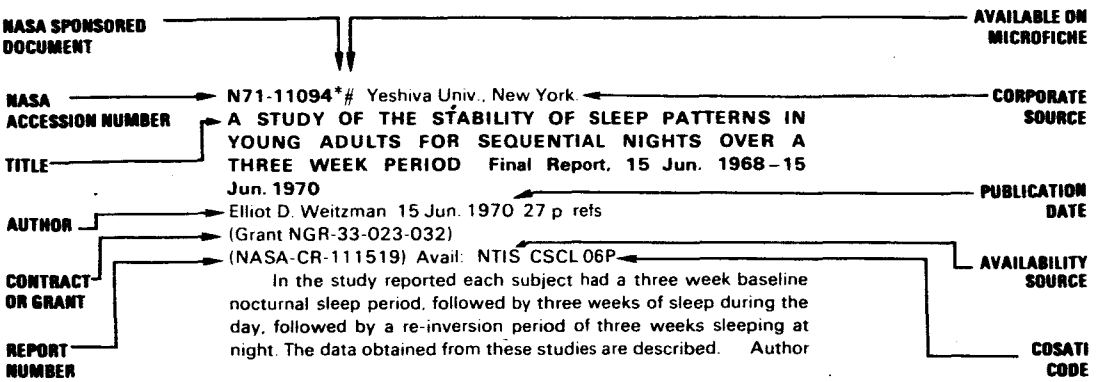

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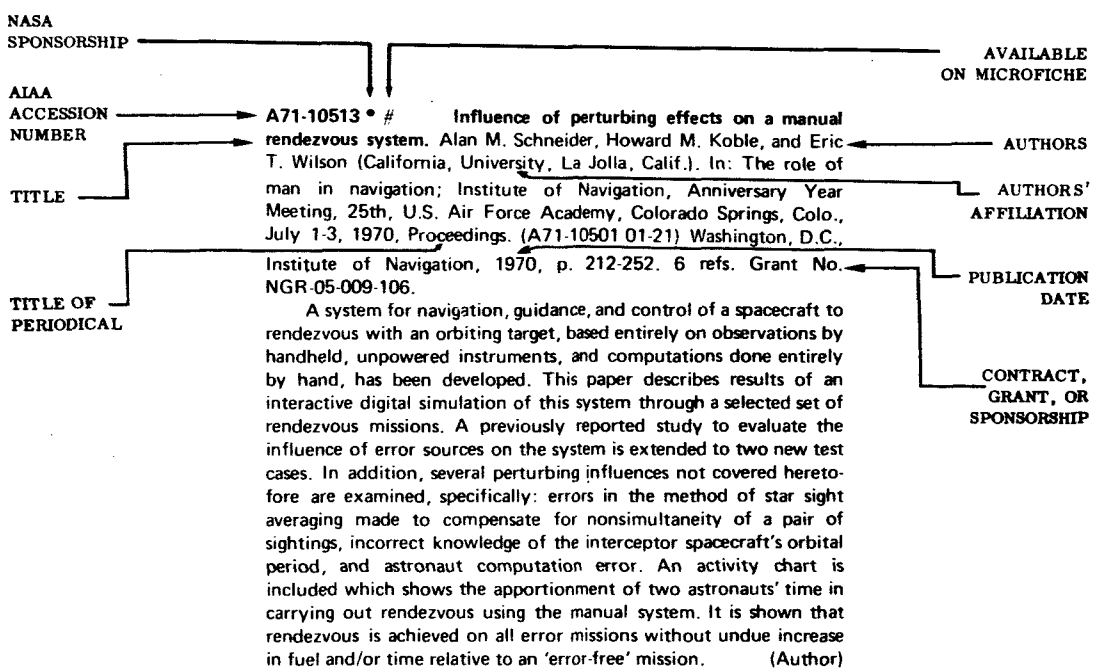

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 87) MARCH 1971

IAA ENTRIES

A71-12976 **Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy).** Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970. 599 p. In Russian.

Contents:

Movement control (Upravlenie dvizheniiami).

Data processing in neuromuscular spindles (Pererabotka informatsii v nervno-myshechnykh veretenakh). J. Richalet, p. 7-19. 22 refs. (See A71-12977 03-05)

A model of a neuromuscular actuating system (Model' nervno-myshechnoi ispolnitel'noi sistemy). D. T. McRuer, R. E. Magdaleno, and G. P. Moore, p. 20-45. 25 refs. (See A71-12978 03-05)

Simulation of a muscle with the aid of information theory (Modelirovanie myshtsy s primeneniem teorii informatsii). R. M. Davies, p. 46-56. 10 refs. (See A71-12979 03-05)

Study of muscle activity control mechanisms (Izuchenie mekhanizmov upravleniia myshechnoi aktivnost'iu). E. A. Andreeva, p. 57-66. 9 refs. (See A71-12980 03-05)

Study of motion control during writing (Izuchenie upravleniia dvizheniiami pri pis'me), p. 67-83.

Study of the system of maintenance of equilibrium in humans (Issledovanie sistemy podderzhaniia ravnovesiia cheloveka). Ph. J. Parquet, P. Vidal, and J. M. Toulotte, p. 84-92. (See A71-12981 03-04)

A model of a vestibular control system (Model' vestibuliarnoi sistemy upravleniia). L. B. Joung, p. 93-119. 27 refs. (See A71-12982 03-05)

Synthesis of a two-legged gait (O sinteze dvunogoi pokhodki), p. 120-131.

Analysis at the neuron level of a system of eye movements induced from the vestibular apparatus (Analiz na neironnom urovne sistemy dvizhenii glaz, indutsirovannykh s vestibuliarnogo apparata). N. Sugie, N. Mano, and T. Kasai, p. 132-154. 12 refs. (See A71-12983 03-04)

Analysis of interacting systems controlling the process of accommodation of the crystalline lens of the eye (Analiz vzaimodeistvuiushchikh sistem upravleniia protsessom akkomodatsii khrustalika glaza). W. D. O'Neill, p. 155-171. 8 refs. (See A71-12984 03-04)

The pupil control system - Its nonlinear, adaptive, and stochastic characteristics (Sistema upravleniia zrachkom - Ee nelineinye, adaptivnye i stokhasticheskie kharakteristiki). L. Stark, p. 172-210. 18 refs. (See A71-12985 03-05)

The role of the peripheral arch of the movement control system (O roli perifericheskoi dugi sistemy upravleniia dvizheniem). A. Gydikov, L. Mitrani, D. Kosarov, and N. Tankov, p. 211-223. 20 refs. (See A71-12986 03-04)

Control of certain types of movements (Ob upravlenii nekotorymi tipami dvizhenii). I. M. Gel'fand, V. S. Gurfinkel', G. N. Orlovskii, E. I. Pal'tsev, F. V. Severin, A. G. Fel'dman, and M. L. Shik, p. 224-240. 20 refs. (See A71-12987 03-04)

Characteristics of the control of sequential systems of human motor reactions (K kharakteristike upravleniia posledovatel'nymi sistemami dvigatel'nykh reaktsii cheloveka). M. A. Alekseev and I. S. Dobronravova, p. 241-251. 7 refs. (See A71-12988 03-04)

'Prediction' of the results of an action in the control of complex biomechanical systems ('Predskazanie' rezul'tatov deistviia v upravlenii slozhnymi biomekhanicheskimi sistemami). A. M. El'ner, p. 252-258. 5 refs. (See A71-12989 03-04)

The problem of the differential equations for the movements of human extremities under conditions of weightlessness and in the presence of accelerations (K voprosu o differentsial'nykh uravneniiakh dvizhenii konechnostei cheloveka v usloviiakh nevesomosti i pri peregruzkakh). L. V. Chkhaidze, p. 259-264. 5 refs. (See A71-12990 03-04)

Bioelectric control and artificial organs (Bioelektricheskoe upravlenie i iskusstvennye organy).

Cybernetic aspects of a mechanism for physiological control on an artificial heart (Kiberneticheskie aspekty mekhanizma dlia fiziologicheskogo regulirovaniia iskusstvennogo serdtsa), p. 265-277.

Ensuring the vitally important functions of an organism as the basis of automatic control of an artificial heart (Obespechenie zhiznenno vazhnykh funktsii organizma kak osnova avtomaticheskogo upravleniia iskusstvennym serdtsem). B. V. Petrovskii, V. I. Shumakov, V. N. Novosel'tsev, E. Sh. Shtengol'd, V. M. Baikovskii, and L. A. Dartav, p. 278-287.

Biological control of artifical respiration and blood circulation (Biologicheskoe upravlenie iskusstvennym dykhaniem i krovoobrashcheniem). A. S. Perel'mutr, V. N. Dmitriev, M. K. Soms, V. G. Gradetskii, M. A. Belilovskii, A. I. Burlakov, I. B. Krishtul, M. N. Katsuba, Iu. S. Gal'perin, and I. K. Gorlin, p. 288-308. 6 refs. (See A71-12991 03-05)

A bioelectrically controlled artificial elbow (Protez loktia s bioelektricheskim upravleniem). R. U. Mann, p. 309-325.

Training of individual spinal nerve cells and its aplication in learning to control myoelectric devices for patients with physical defects (Trenirovka otdel'nykh spinal'nykh nervnykh kletok i ee primenenie v obuchenii upravleniiu mioelektricheskimi ustroistvami dlia bol'nykh s fizicheskimi nedostatkami), p. 326-331.

Optimization of hemodialysis with the aid of a computer (Optimizatsiia gemodializa s pomoshch'iu vychislitel'noi mashiny), p. 332-345.

Use of computers for processing biological data (Primenenie EVM dlia obrabotki biologicheskoi informatsii).

Digital filtration and processing of electrocardiograms (Tsifrovaia fil'tratsiia i obrabotka elektrokardiogramm). C. S. Weaver, J. Von Der Groeben, J. G. Toole, and J. W. Fitzgerald, p. 346-379.

10 refs. (See A71-12992 03-05)

Computer solution of the problem of the electric field during impedance plethysmography (Reshenie na vychislitel'noi mashine zadachi ob elektricheskom pole pri pletizmografii impedansa). E. Kinnen, p. 380-391. 8 refs. (See A71-12993 03-05)

Stochastic method of analyzing blood circulation systems with the aid of an analog correlator (Stokhasticheskii metod analiza sistem krovoobrashcheniia s pomoshch'iu analogovogo korreliatora). B. Szücz and E. Monos, p. 392-407. 8 refs. (See A71-12994 03-04)

Study of the cardiovascular control system with the aid of an analog computer (Issledovanie serdechno-sosudistoi sistemy reguli-rovaniia s pomoshch'iu analogovoi vychislitel'noi mashiny). W. D. Pickering, P. N. Nikiforuk, and J. E. Merriman, p. 408-421. 23 refs. (See A71-12995 03-05)

A mathematical model of an enzyme reaction - Application to a study of the ADF-ATF metabolism reaction (Matematicheskaia model' fermentativnoi reaktsii - Primenenie k izucheniiu obmennoi reaktsii ADF-ATF), p. 422-442.

Interaction between humans and automatic devices in control systems (Vzaimodeistvie cheloveka i avtomaticheskikh ustroistv v sistemakh upravleniia).

Interaction between humans and machines in large systems (Vzaimodeistvie cheloveka i mashiny v bol'shikh sistemakh). G. Schweizer, p. 443-456, 571-573. (See A71-12996 03-05)

A model of psychological and physiological development of habits - An automatic control system (Model' psikhologicheskogo i fiziologicheskogo razvitiia navykov - Sistema avtomaticheskogo upravleniia). E. S. Krendel and D. T. McRuer, p. 457-476, 571-573. 19 refs. (See A71-12997 03-05)

Organization of the process of skill acquisition and the behavior of human during learning (Organizatsiia protsessa priobreteniia navykov i povedenie cheloveka pri obuchenii). J. L. Meiry, p. 477-493, 571-573. 6 refs. (See A71-12998 03-05)

Modeling the work of a thinking operator (Modelirovanie raboty myslіashchego operatora). M. Strizenec, p. 494-500, 571-573. (See A71-12999 03-05)

Development of methods of constructing and evaluating information display systems (K razrabotke metodov postroeniia i otsenki sistem predstavleniia informatsii). D. I. Ageikin, A. I. Galaktionov, I. V. Kazarinova, I. M. Panasenko, and L. V. Fatkin, p. 501-518.

Principles of construction of complexes for continuous monitoring of the human organism and automatic normalization of its states (O printsipakh postroeniia kompleksov dlia nepreryvnogo kontrolia za organizmom cheloveka i avtomaticheskoi normalizatsii ego sostoianii). V. M. Akhutin, p. 519-532, 571-573. 11 refs. (See A71-13000 03-05)

Engineering-psychological problems in the construction of large systems (Inzhenerno-psikhologicheskie voprosy postroeniia bol'shikh sistem). I. V. Eremenko, B. F. Lomov, R. M. Mansurov, and V. F. Rubakhin, p. 533-543, 571-573. 7 refs. (See A71-13001 03-05)

Heuristic aspects of the 'man and large system' problem (Evristicheskie aspekty problemy 'chelovek i bol'shaia sistema'). V. N. Pushkin, p. 544-556.

Heuristic programs of decision-making (Evristicheskie programmy priniatiia reshenii). A. V. Napalkov, p. 557-573. 5 refs. (See A71-13002 03-05)

A71-12977 # **Data processing in neuromuscular spindles (Pererabotka informatsii v nervno-myshechnykh veretenakh).** J. Richalet. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 7-19. 22 refs. In Russian.

Description of the properties and functions of muscle spindles, which are the sensors of length and velocity in muscles. When a spindle is subjected to tension at a constant velocity, two types of fibers (one carrying velocity information, and the other carrying information about length) are excited at different frequencies. A model based on the mechanical and electrical properties of the spindles is proposed, which corresponds to the results of experiments. The spindles have their own efferent control, so that pulsed stimulation can be imparted to them. An output signal was observed at the primary endings (in the case of fibers carrying velocity information) with the aid of a new method using a frequency meter. This method is found to be entirely applicable in searching for the data lost during the coding of the action potential of a generator. To model this coding device, a relaxation-type generator using a first-order system is proposed. The time constant of the coding device may be determined by a static method based on measurements of the frequency dispersion of the action potentials. A.B.K.

A71-12978 # **A model of a neuromuscular actuating system (Model' nervno-myshechnoi ispolnitel'noi sistemy).** D. T. McRuer, R. E. Magdaleno, and G. P. Moore. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 20-45. 25 refs. In Russian.

Brief review of data regarding the possibility of describing systems of neuromuscular activity in humans, and development of a simple model of this activity. Physiological data including a description of muscle spindles and the input-output relations for muscles are presented. Particular attention is devoted to a study of oscillations of the system parameters as a function of the mean muscle stress and to a determination of the role of a muscle spindle as a comparison element, noting the effect of the latter on muscle tone. Data concerning the describing function of a human operator are presented, including the phase covariance at high and low frequencies and the phase variation at high frequencies for given changes in stress. A model of neuromuscular activity is proposed which is based on these data and describes them well. In this model the muscle spindles are portrayed as fulfilling four distinct functions. A.B.K.

A71-12979 # **Simulation of a muscle with the aid of information theory (Modelirovanie myshtsy s primeneniem teorii informatsii).** R. M. Davies. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 46-56. 10 refs. In Russian.

Development of a statistical approach to the analysis of human muscle behavior based on methods employed in thermodynamics. In this case the muscle is regarded as consisting of a contractile part connected in series with elastic elements (including tendons) and in parallel with other elastic elements (the sarcolemma). The proposed approach is constructed in such a way as to depict each motor unit. Since the analysis performed is limited to the case of isometric stress, dissipation related to velocity and usually ascribed to viscous damping or heating effects is not taken into account. It is therefore assumed that a stress of measurable magnitude is created by asynchronous excitation of the motor units of which the muscle is composed and that these units are excited as a result of the arrival of a random flux of action potentials from the central nervous system. These potentials may be recorded with the aid of electromyograms. A.B.K.

A71-12980 # **Study of muscle activity control mechanisms (Izuchenie mekhanizmov upravleniia myshechnoi aktivnost'iu).** E. A. Andreeva. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 57-65; Discussion, P. Grin, p. 66. 9 refs. In Russian.

Review of experimental work performed for the purpose of ascertaining the mechanisms of muscle activity control in animals. In this connection a special procedure for locking the animal into an external feedback loop is described, by means of which the magnitude of the exciting stimulus imparted to the animal is made to depend on the stressed state of one or two independent muscles. Moreover, there exists only one value of the stressed state of a muscle or pair of muscles at which the value of the exciting stimulus is minimal or equal to zero. The procedure developed makes it possible to study the work of the brain in solving a search problem imposed externally and varied at will by the tester. Moreover, an experimental investigation is made of the mechanism of muscle activity control in a pair of previously coupled antagonist muscles under natural conditions of solution of the search problem, given accurate maintenance of the articulation angle during extremely rapid changes in this angle. On the basis of these experiments, model concepts of the mechanism of muscle activity control in the above-mentioned problems are devised. A.B.K.

A71-12981 # **Study of the system of maintenance of equilibrium in humans (Issledovanie sistemy podderzhaniia ravnovesiia cheloveka).** Ph. J. Parquet, P. Vidal, and J. M. Toulotte. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 84-92. In Russian.

Development of an analogy between the work of the equilibrium maintenance system in humans and the behavior of a multiinput/multioutput controller. Such an equilibrium maintenance system is of course localized in the human body, and it is necessary first of all to solve the problem of the most accurate description of its external manifestations. A study is made of the motion of the projection of the human center of gravity onto the horizontal plane. With the aid of a device which makes it possible to perform static and dynamic investigations of the process, various experimental characteristics of normal individuals are statistically determined. Then the parameters of a control system which is an analog model of a 'biological controller' of equilibrium are determined. A.B.K.

A71-12982 # **A model of a vestibular control system (Model' vestibuliarnoi sistemy upravleniia).** L. B. Joung. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 93-119. 27 refs. In Russian.

Mathematical description of the human vestibular system, which ensures dynamic orientation in space, using identification methods of automatic control theory. A biocybernetic model is used to predict the perception by man of his position in space, pose reactions, eye nystagmus, and control actions based on motor commands. In the case of the semicircular canals, which act as angular velocity sensors, an analysis is made of the dynamics of motion of the fluid. The limitations of a torsion pendulum model are investigated, and a quantitative description of adaptation phenomena is proposed. An otolith model which reacts to the forces caused by linear accelerations is presented, and agreement is shown between this model and data concerning the perception of linear displacement and angles of inclination, data concerning counterrotation of the eyes, and electrophysiological data. Mutual coupling effects are discussed, including the effect of linear acceleration on the semicircular canals. A.B.K.

A71-12983 # **Analysis at the neuron level of a system of eye movements induced from the vestibular apparatus (Analiz na neironnom urovne sistemy dvizhenii glaz, indutsirovannykh s vestibuliarnogo apparata).** Noboru Sugie, Nobuoki Mano, and Takeshi Kasai. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 132-154. 12 refs. In Russian.

Study of a system of control of eye movements in cats caused by rotation of the head. This study was performed at the neuron level at the main points of the signal transmission loop - namely, the primary vestibular nerve, the vestibular nucleus, and the efferent nucleus of the nerve. Single discharges were analyzed with the aid of an operative data processing system. From an analysis of the frequency and transient characteristics five types of cells are detected. On the basis of the data obtained a fairly accurate mathematical model is constructed. A.B.K.

A71-12984 # **Analysis of interacting systems controlling the process of accommodation of the crystalline lens of the eye (Analiz vzaimodeistvuiushchikh sistem upravleniia protsessom akkomodatsii khrustalika glaza).** W. D. O'Neill. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 155-171. 8 refs. In Russian.

Construction of a mathematical model of a system of control of the process of accommodation of the crystalline lens of the human eye. The model takes into account the interaction between the pupil and the accommodation process, and is thus a two-loop model. The dynamic equations for the crystalline lens and the pupil are derived from classical muscle mechanics and experiments, and also from experiments performed by the author on cats and humans. The experiments on cats were performed according to an open-loop method designed to determine the dynamics in the absence of neurological control. In the case of the humans closed-loop experiments were performed. They were used to determine the reactions of the system as a whole in the presence of neurological control of the system. The model obtained was simulated on a computer under the assumption of U control on the part of the neurological system. A.B.K.

A71-12985 # **The pupil control system - Its nonlinear, adaptive, and stochastic characteristics (Sistema upravleniia zrachkom - Ee nelineinye, adaptivnye i stokhasticheskie kharakteri-**

stiki). L. Stark. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 172-210. 18 refs. In Russian.

Description of three methods of investigating the neurological system controlling the reaction of the pupil to light and regulating the pupil during the process of accommodation. The methods considered are an analysis of the system on the basis of Wiener nuclei, a statistical noise analysis, and a study of the system on the basis of neurophysiological procedures. A description is given of the distribution function and the frequency characteristics of the noises in the pupil. On the basis of experiments on accommodation of the pupil and its reaction to illumination, and taking into account the strong correlation between the noise in both eyes, it is concluded that the source of the noise or the point of entry of the noise is an Edinger-Westfal nucleus. It is confirmed by neurological studies that the site of limitation of the dynamics of an object is located in neuromuscular elements. On the basis of microelectrode recordings of individual neurons in the brain stem it is concluded that an interesting interaction exists between various parts of the neurological subsystem controlling the pupil size. A.B.K.

A71-12986 # The role of the peripheral arch of the movement control system (O roli perifericheskoi dugi sistemy upravleniia dvizheniem). A. Gydikov, L. Mitrani, D. Kosarov, and N. Tankov. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 211-223. 20 refs. In Russian.

Investigation of the mechanism of adaptation of movement reactions to external forces which arise or vary as a result of certain changes in the state of excitation. On the basis of a correlation between the exact structures of both mechanical and bioelectric actions, an attempt is made to evaluate the role of the form of the action and the form of the reaction of the motor neurons in order to ascertain the genesis of the microstructure of the motor reactions. The phenomena of synchronization and desynchronization of motor neuron reactions are investigated under various conditions. Models of a system for controlling a movement as a hierarchical structure are considered, together with the hypothetical role of the level of the cerebrospinal canal of this system in processes of adaptation to an external force field. The possible role of feedback on the level of the cerebrospinal canal is also considered. A.B.K.

A71-12987 # Control of certain types of movements (Ob upravlenii nekotorymi tipami dvizhenii). I. M. Gel'fand, V. S. Gurfinkel', G. N. Orlovskii, E. I. Pal'tsev, F. V. Severin, A. G. Fel'dman, and M. L. Shik. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 224-239; Discussion, L. V. Chkhaidze, p. 240. 20 refs. In Russian.

Development of certain concepts regarding the nature of the interlevel interaction in the movement control system, citing results obtained in studies involving humans and in experiments on animals. In this connection special attention is devoted to an analysis of the autonomic mechanisms used in movement control. In the studies involving humans it was found that before the start of an arbitrary movement changes occur in the state of the spinal cord in keeping with the nature of the impending motor act. The changes occurring in the spinal cord during certain rhythmic movements are no less significant. In studying the retention of a vertical position by human subjects, a 'cooperative' work of the muscles was noted, owing to which disturbances in the position of the overall center of gravity of the body resulting from respiration are not simply corrected but are prevented. Hypotheses concerning the neurophysiological mechanisms of these phenomena are discussed. An attempt is made to estimate the importance of these mechanisms in the fundamental scheme of control of these movements. A study of movement coordination in animals during walking and running revealed certain basic features of the neurophysiological mechanisms of locomotion control, by means of which relations are established between movements in all joints of a particular extremity and coordination of movements of different extremities is achieved. A.B.K.

A71-12988 # Characteristics of the control of sequential systems of human motor reactions (K kharakteristike upravleniia posledovatel'nymi sistemami dvigatel'nykh reaktsii cheloveka). M. A. Alekseev and I. S. Dobronravova. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 241-251. 7 refs. In Russian.

Study of certain mechanisms of formation and control of an elementary sequential system of human motor reactions - by repetition of the motion in accordance with the repetition of an external signal. It is shown that two basic conditioned reactions are interacting in this system: a reaction to the external stimulus, and a reaction to the time interval at which the stimulus is repeated. Two types of such interaction are considered. It is found that at the start of the process of formation of a sequential system of motor reactions the participation in this process of generalized processes in the central nervous system including both cortical formations and subcortical nonspecific systems is fairly great. However, this participation decreases considerably during the generation and reinforcement of this system. Slight changes in the parameters of the reinforced system may be regulated without significantly disturbing it, thus attesting to a certain autonomy in its control. Large disturbances of the system invariably cause the appearance of generalized reactions of the central nervous system. A.B.K.

A71-12989 # 'Prediction' of the results of an action in the control of complex biomechanical systems ('Predskazanie' rezul'tatov deistvila v upravlenii slozhnymi biomekhanicheskimi sistemami). A. M. El'ner. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 252-258. 5 refs. In Russian.

Summary of experimental data showing that one of the principles of control of the support-motor apparatus is an anticipating movement which is a preparatory adjustment of the complex biomechanical system to a perturbation which may arise as a result of performance of the movement. Under these conditions the work

of the movement control system is not constructed in the form of an automatic compensatory feedback but in the form of a preparatory change in the state of the respective skeletal muscles which, to a considerable extent, prevents perturbations of the biomechanical system as a whole. The preparatory changes in the support-motor apparatus may be regarded as the occurrence of a 'prediction' of the results of an action during the performance of motor acts. A.B.K.

A71-12990 # **The problem of the differential equations for the movements of human extremities under conditions of weightlessness and in the presence of accelerations (K voprosu o differentsial'nykh uravneniiakh dvizhenii konechnostei cheloveka v usloviiakh nevesomosti i pri peregruzkakh).** L. V. Chkhaidze. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 259-264. 5 refs. In Russian.

Analysis of the differential equation describing the motion of the hand in the cubital joint, and demonstration that in the case of weightlessness this equation is considerably simplified. In the case of accelerations, on the other hand, both in performing movements and in maintaining a given value of the joint angle, a greater quantity of control data is required than under conditions of normal gravitation. These results give a good explanation of the experimental data concerning the movements of man in outer space. It is concluded that control by man of his arbitrary movements in weightlessness will be achieved under simpler coordination conditions after appropriate adaptation. A.B.K.

A71-12991 # **Biological control of artificial respiration and blood circulation (Biologicheskoe upravlenie iskusstvennym dykhaniem i krovoobrashcheniem).** A. S. Perel'mutr, V. N. Dmitriev, M. K. Soms, V. G. Gradetskii, M. A. Belilovskii, A. I. Burlakov, I. B. Krishtul, M. N. Katsuba, Iu. S. Gal'perin, and I. K. Gorlin. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 288-308. 6 refs. In Russian.

Description of a number of apparatuses for controlling artificial respiration and blood circulation. Three apparatuses in which artificial respiration is achieved with the aid of information coming from the organism are discussed. Two of them employ an electrical system for controlling supplementary respiration. Not only is synchronous respiration of the apparatus and the patient ensured, but various emergency devices for the case of total cessation of spontaneous respiration are provided. The remaining apparatus is distinguished by the fact that in it the control devices are separated from the actuating devices, and are constructed from fluidic elements. An apparatus for supplementary artificial blood circulation with a bioelectric control of the 'biopulse' type is described, which realizes the principle of shaping and subsequent amplification of a low-power pulsating flow. A.B.K.

A71-12992 # **Digital filtration and processing of electrocardiograms (Tsifrovaia fil'tratsiia i obrabotka elektrokardiogramm).** C. S. Weaver, J. Von Der Groeben, J. G. Toole, and J. W. Fitzgerald. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 346-378; Discussion, V. M. Akhutin, p. 379. 10 refs. In Russian.

Summary of the successes achieved in interdiscipline work on the use of digital computers for the sampling and classification of electrocardiograms. Special attention is given to the development of digital methods of noise filtration and to schemes for classifying electrocardiograms on computers with the aid of a number of patterns derived from ordinary studies of the heart. Adaptive methods of image identification for the classification of electrocardiograms are described. All the filtration operations are performed by a digital computer using a system of linear difference equations. The frequency characteristics of these equations may be assigned much more accurately than in the case of the corresponding analog filter. The filtered electrocardiograms may be represented on a calibrated device in the form of a set of scalars, plane loops, or in spherical coordinates. The recording is compared with a set of normal patterns in order to produce a diagnostic image. A.B.K.

A71-12993 # **Computer solution of the problem of the electric field during impedance plethysmography (Reshenie na vychislitel'noi mashine zadachi ob elektricheskom pole pri pletizmografii impedansa).** E. Kinnen. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 380-390; Discussion, G. I. Iuzefovich, p. 391. 8 refs. In Russian.

Development of a practical method, based on the Jacobi iterative method, for solving boundary value problems of total impedance plethysmography on a computer. A single equation is derived for all points of the matrix - i.e., for its internal nodes - and for the boundaries of the subregions or boundary nodes. The value of each node is stored as a real number representing the phase properties at a given point and the corresponding or repeated potential. Thus the model geometry and the solution are contained in the bulk of a single matrix, and the calculations are performed irrespective of the model geometry at each node. The program thus developed is used to obtain the current configuration in the human chest cavity. On the basis of the iterative values of the potential additional programs for calculating the electric current in terms of points and tissues are presented. A.B.K.

A71-12994 # **Stochastic method of analyzing blood circulation systems with the aid of an analog correlator (Stokhasticheskii metod analiza sistem krovoobrashcheniia s pomoshch'iu analogovogo korreliatora).** B. Szücs and E. Monos. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 392-406; Discussion, V. M. Akhutin, p. 407. 8 refs. In Russian.

Investigation of the dynamic parameters of the change in the blood flow in the adrenal gland and determination of the arterial pressure during stochastic excitation of centripetal (brachial and sciatic) and centrifugal (vagus) nerves in anesthetized dogs. The nerves were excited by series of rectangular pulses from bipolar electrodes. The pulse frequency was established by a random noise generator. Analog signals from the measurement of the stimulus, the blood flow in the adrenal gland, and the arterial pressure were continuously recorded on the magnetic tape of a correlator and on a

polygraph. The amplitude and energy spectral density, as well as the auto- and cross-correlograms of the signals, were regularly determined with the aid of an analog correlator. The correlograms were used to calculate the dynamic characteristics of the part of the body where the circulation system was being tested. The system identification was achieved in the time domain on the basis of the correlograms, by means of an operator with respect to the energy completeness of the spectra. A typical linear mathematical model with mixed parameters was constructed. The transfer functions obtained contained equivalent transfer coefficients, time constants (first- and second-order), damping factors, and cutoff times. An interpretation of the dynamic parameters in the circulation system is presented. The characteristics of these parameters as functions of the bandwidth of the stimulus, the variety of the animal, the method of anesthetization, and a change in the hormone state causing acute hypophysectomies and hemorrhagic hypotension were compared with the characteristics of the initial spontaneous state of the animals. A.B.K.

A71-12995 # Study of the cardiovascular control system with the aid of an analog computer (Issledovanie serdechno-sosudistoi sistemy regulirovaniia s pomoshch'iu analogovoi vychislitel'noi mashiny). W. D. Pickering, P. N. Nikiforuk, and J. E. Merriman. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 408-421. 23 refs. In Russian.

Consideration of a simplified model of the system controlling human cardiovascular activity. The proposed model has been programmed on an analog computer and can be adjusted to reproduce the reaction of a human subject to a submaximal working load. An estimate is made of the extent to which the model corresponds to real conditions, and recommendations are made concerning the further development of the model. A.B.K.

A71-12996 # Interaction between humans and machines in large systems (Vzaimodeistvie cheloveka i mashiny v bol'shikh sistemakh). G. Schweizer. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 443-456; Discussion, I. B. Gurevich, p. 571-573. In Russian.

Development of methods of describing the behavior of a human operator as a controller in a man/machine system. Studies are performed to determine possible changes in a one-dimensional model of such a system so as to obtain a good model of a multidimensional manual control system. It is shown by experiment that a discrete system with a random sampling time is necessary for this purpose. In order to determine the characteristics of a human operator in multidimensional problems, an attempt is made to simplify the model by using the methods of information theory. It is shown that if the inherent dynamics of the operator are known the quality indices of manual control systems can be determined by the methods of information theory. A.B.K.

A71-12997 # A model of psychological and physiological development of habits - An automatic control system (Model' psikhologicheskogo i fiziologicheskogo razvitiia navykov - Sistema avtomaticheskogo upravleniia). E. S. Krendel and D. T. McRuer. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 457-475; Discussion, V. Findeizen and I. B. Gurevich, p. 476, 571-573. 19 refs. In Russian.

Consideration of the behavior of a human operator during the process of perfecting his control of the machine - i.e., during the process of learning. A model of this behavior is proposed which is based on a rearrangement of the control structure so as to be able to distinguish physically or mentally the patterns of the input actions. The results of numerous experiments are presented to confirm the correctness of the model. Problems related to the design of such control systems and to an investigation of learning processes are considered. A.B.K.

A71-12998 # Organization of the process of skill acquisition and the behavior of humans during learning (Organizatsiia protsessa priobreteniia navykov i povedenie cheloveka pri obuchenii). J. L. Meiry. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 477-493; Discussion, I. B. Gurevich, p. 571-573. 6 refs. In Russian.

Outline of a theory and method of modeling the behavior of a human operator in the process of acquiring motor skills while solving manual control problems. Assuming this process to be stochastic, a model is constructed where the operator is represented in the form of a single-channel data processing system, in which the choice of alternative reactions and the revision of preferences are functions of the solving center. The proposed model is presented in the form of a computer program obtained by converting theory into machine language. The model is then used in a study of the behavior of a human operator learning to control the state of a dynamic process by acting on a two-position relay controller. A.B.K.

A71-12999 # Modeling the work of a thinking operator (Modelirovanie raboty mysliashchego operatora). M. Striženec. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 494-500; Discussion, I. B. Gurevich, p. 571-573. In Russian.

Comments on the development of a model of a human operator's processes of thinking and decision-making. The thinking functions of an operator which should be entrusted to a computer are described. Attempts made to develop a model of the thinking of an operator within the framework of psychology are reviewed. The results of a determination of the dynamic characteristics of the thinking process of an operator in laboratory tests using the PSI apparatus are summarized. A.B.K.

A71-13000 # Principles of construction of complexes for continuous monitoring of the human organism and automatic

normalization of its states (O printsipakh postroeniia kompleksov dlia nepreryvnogo kontrolia za organizmom cheloveka i avtomaticheskoi normalizatsii ego sostoianii). V. M. Akhutin. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 519-532; Discussion, I. B. Gurevich, p. 571-573. 11 refs. In Russian.

Consideration of the principles of construction of closed systems for continuous automatic monitoring of the human organism and for controlling its most important physiological processes for the purpose of normalizing its states when situations harmful to the organism arise. The results of certain recently performed investigations in the field of biological and medical cybernetics are cited to illustrate the realization of a general approach to the development of such complexes. A.B.K.

A71-13001 # Engineering-psychological problems in the construction of large systems (Inzhenerno-psikhologicheskie voprosy postroeniia bol'shikh sistem). I. V. Eremenko, B. F. Lomov, R. M. Mansurov, and V. F. Rubakhin. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 533-543; Discussion, I. B. Gurevich, p. 571-573. 7 refs. In Russian.

Demonstration that the solution of engineering-psychological problems in the principal stages of design of large systems consists of psychophysiological, strictly engineering-psychological, and system-engineering analyses. At the first level an estimate is made of the differentiated and integral characteristics of a human operator as a link in the control system. At the second level an algorithmic analysis is made of the structure of the operator's activity and an estimate is made of the possibility and advisability of automating this activity, taking into account the patterns of development and formation of the various operations. At the third level the place of the human operator in subsystems and in the system as a whole is determined. A.B.K.

A71-13002 # Heuristic programs of decision-making (Evristicheskie programmy priniatiia reshenii). A. V. Napalkov. In: Bioelectric control. Man and automatic systems; International Symposium on Technical and Biological Control Problems, Yerevan, Armenian SSR, September 24-28, 1968, Transactions (Bioelektricheskoe upravlenie. Chelovek i avtomaticheskie sistemy; Mezhdunarodnyi Simpozium po Tekhnicheskim i Biologicheskim Problemam Upravleniia, Yerevan, Armenian SSR, September 24-28, 1968, Trudy). (A71-12976 03-05) Edited by A. Ia. Lerner. Moscow, Izdatel'stvo Nauka, 1970, p. 557-568; Discussion, E. V. Voloshinova and I. B. Gurevich, p. 569-573. 5 refs. In Russian.

Description of a decision-making program which reflects the functioning of the human brain in situations where no specific goal is established for the solution of the problem, but only a certain list of requirements which the results of the solution must satisfy. In this case several solution variants are possible. The program, which considers systems of admissible permutations, calculates weighted coefficients of attainability of certain components of various subgoals. Then the most attainable solution variant is ascertained, and the development of search plans is begun. The various plans are compared on the basis of calculations of a so-called 'effectiveness' coefficient. A.B.K.

A71-13014 * Synthesis of amino acids by the heating of formaldehyde and ammonia. Sidney W. Fox and Charles R. Windsor (Miami, University, Coral Gables, Fla.). *Science*, vol. 170, Nov. 27, 1970, p. 984-986. 19 refs. Grant No. NGR-10-007-008; Contract No. NAS 9-8101.

The heating of formaldehyde and ammonia yields a product that, on hydrolysis, is converted into seven amino acids: aspartic acid, glutamic acid, serine, proline, valine, glycine, and alanine. Glycine is the predominant amino acid. Inasmuch as formaldehyde and ammonia have been identified as compounds in galactic clouds, these experimental results are interpreted in a cosmochemical and geochemical context. (Author)

A71-13015 Amino acid synthesis in simulated primitive environments. H. R. Hulett (Stanford University, Stanford, Calif.), A. Bar-Nun, N. Bar-Nun, S. H. Bauer, and Carl Sagan (Cornell University, Ithaca, N.Y.). *Science*, vol. 170, Nov. 27, 1970, p. 1000-1002. 10 refs. Grant No. NGR-33-010-101.

Discussion of the possible effect of meteoric energy on the synthesis of amino acids in simulated primitive environments. In addition, the mechanism of synthesis proposed by Bar-Nun et al. (1970) involving shock waves associated with lightning is discussed and is found to be of doubtful validity. Z.W.

A71-13021 The effect of weather on man (Der Einfluss des Wetters auf den Menschen). Karl Heigel (Bundesministerium für Verkehr, Deutscher Wetterdienst, Bad Tölz, West Germany). *Deutscher Aerokurier*, vol. 14, Nov. 1970, p. 818, 819. In German.

Study of the effect of the individual phases in a weather scheme on the state of health of man and on his ability to cope with the requirements of an exacting task - e.g., piloting an aircraft. It is pointed out that a man in perfect health should theoretically not be affected by variations in the weather. However, the average person is found to be negatively affected by various types of weather which are analyzed. Particular caution is recommended for aircraft pilots on days with unfavorable weather. G.R.

A71-13058 Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). Edited by Ludwig Demling and Kurt Bachmann (Medizinische Universitätsklinik, Erlangen, West Germany). Stuttgart, Georg Thieme Verlag, 1970. 285 p. In German and English.

Contents:

Foreword (Vorwort). L. Demling (Medizinische Universitätsklinik, Erlangen, West Germany), p. V.

Editors and collaborators (Herausgeber und Mitarbeiter), p. VI-VIII.

Biotelemetric techniques (Zur Technik der Biotelemetrie). G. J. Ullrich (Fritz Hellige und Co. GmbH, Freiburg im Breisgau, West Germany), p. 1-13. 20 refs. (See A71-13059 03-05)

Problems involved in test data acquisition and in electrode techniques (Probleme der Messwertgewinnung und Elektrodentechnik). P. A. Vogel (Fritz Hellige und Co. GmbH, Freiburg im Breisgau, West Germany), p. 13-27. 11 refs. (See A71-13060 03-05)

Long-term ECG recordings in healthy subjects (Langzeit-Ekg-Registrierungen bei gesunden Versuchspersonen). B. Schmücker, D. Sell, K. Kastner, H. Heck, and W. Hollmann (Deutsche Sporthochschule, Cologne, West Germany), p. 44-52. 70 refs. (See A71-13061 03-05)

The importance of electrocardiograms for aviation medicine, with particular regard to telemetric inflight recordings (Die Bedeutung des Ekg für die Flugmedizin unter besonderer Berücksichtigung telemetrischer inflight-Ableitungen). H. W.

Kirchhoff (Bundesministerium der Verteidigung, Fürstenfeldbruck, West Germany), p. 71-77. 15 refs. (See A71-13062 03-05)

Telemetry in aviation medicine (Die Telemetrie in der Luftfahrtmedizin). K. Grasser (Medizinische Universitätsklinik, Erlangen, West Germany), p. 77-80. (See A71-13063 03-05)

Telemetry of stress ECG during amateur flights (Telemetrie des Belastungs-Ekg beim Sportflug). J. Eichler and I. Lobsien (Medizinische Akademie, Lübeck, West Germany), p. 81-87. (See A71-13064 03-05)

Telemetric ECG tests during work under an anomalous heat stress (Telemetrische Ekg-Untersuchungen bei Arbeiten unter abnormer Hitzebelastung). R. Hauf (Freiburg, Gewerbeaufsichtsamt, Freiburg, West Germany), D. Ohmann, and H. Ohmann, p. 87-91. (See A71-13065 03-05)

Biotelemetry and computer analysis of electrocardiograms. P. J. Amlinger (Missouri, University, Columbia, Mo.), p. 126-141. 12 refs. (See A71-13066 03-05)

The importance of EEGs for aviation medicine, with particular regard to telemetered inflight recordings (Die Bedeutung des EEG für die Flugmedizin mit besonderer Berücksichtigung telemetrierter inflight-Ableitungen). J. C. Aschoff (Medizinisch-Naturwissenschaftliche Hochschule, Ulm, West Germany), p. 154-163. 20 refs. (See A71-13067 03-05)

Telemetry of ventilatory volumes (Telemetrie von Atemgrössen). H. Drasche (Saarland, Universität, Saarbrücken, West Germany), p. 164-180. 36 refs. (See A71-13068 03-05)

Application of new semiconductor elements for signal transmission in telemetry of blood pressure data (Anwendung neuer Halbleiterbauelemente für die Signalübertragung in der Blutdrucktelemetrie). R. Zerzawy and K. Bachmann (Medizinische Universitätsklinik, Erlangen, West Germany), p. 202-209. 6 refs. (See A71-13069 03-05)

Wireless blood pressure telemetry (Drahtlose Blutdrucktelemetrie). K. Bachmann (Medizinische Universitätsklinik, Erlangen, West Germany), p. 210-219. 11 refs. (See A71-13070 03-05)

A71-13059 Biotelemetric techniques (Zur Technik der Biotelemetrie). G. J. Ullrich (Fritz Hellige und Co. GmbH, Freiburg im Breisgau, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 1-13. 20 refs. In German.

Discussion of the objectives, principles, and implementation of biotelemetric techniques. A definition of the term biotelemetry is given, and the purpose and the areas of application of this technique are briefly explained. This is followed by systematic considerations on the technological aspects of both wire and wireless biotelemetric systems. In particular, the selection of radio frequency, transmitting power, and method of modulation is discussed. Limitations imposed by regulations of telecommunication authorities are also outlined, with particular reference to the present situation in Europe. O.H.

A71-13060 Problems involved in test data acquisition and in electrode techniques (Probleme der Messwertgewinnung und Elektrodentechnik). P. A. Vogel (Fritz Hellige und Co. GmbH, Freiburg im Breisgau, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 13-27. 11 refs. In German.

Discussion of the various problems of scanning and transmitting test data from biological objects. Telemetric aspects and signal conditioning are considered. Particular attention is given to electrode techniques and difficulties encountered in this area. O.H.

A71-13061 Long-term ECG recordings in healthy subjects (Langzeit-Ekg-Registrierungen bei gesunden Versuchspersonen). B. Schmücker, D. Sell, K. Kastner, H. Heck, and W. Hollmann (Deutsche Sporthochschule, Cologne, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 44-52. 70 refs. In German. Research supported by the Kuratorium für die Sportmedizinische Forschung.

Experimental investigation of the action potentials of the heart recorded in 48 male healthy subjects over a long period by using the Holter-Avionic dynamic ECG system. The major areas of interest were the qualitative and quantitative variations of the 'normal' ECG. The results obtained are shown graphically and analyzed. O.H.

A71-13062 The importance of electrocardiograms for aviation medicine, with particular regard to telemetric inflight recordings (Die Bedeutung des Ekg für die Flugmedizin unter besonderer Berücksichtigung telemetrischer inflight-Ableitungen). H. W. Kirchhoff (Bundesministerium der Verteidigung, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 71-77. 15 refs. In German.

Discussion of the various results obtained so far by telemetric ECG diagnostics of aircraft pilots. A review of the current experience in the field of telemetric inflight ECG recordings is presented, and several characteristic recordings are discussed and evaluated. It is shown that to utilize ECG telemetry efficiently for functional diagnosis, a further development of measuring probes is necessary, since the advantages of transmitting data are only attained when as many parameters as possible are transmitted simultaneously. O.H.

A71-13063 Telemetry in aviation medicine (Die Telemetrie in der Luftfahrtmedizin). K. Grasser (Medizinische Universitätsklinik, Erlangen, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 77-80. In German.

Review of the extensive possibilities of application of telemetric techniques in aviation medicine and the results obtained so far in this field. Based on a number of examples, it is shown that telemetric methods of measurement combine the advantage of a prolonged observation with the possibility of analyzing physiological processes as a function of varying forms of exercise and stress. For this reason, they represent a test procedure which is particularly suitable for examining several unresolved problems in the field of aviation medicine. O.H.

A71-13064 Telemetry of stress ECG during amateur flights (Telemetrie des Belastungs-Ekg beim Sportflug). J. Eichler and I. Lobsien (Medizinische Akademie, Lübeck, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 81-87. In German.

Experimental telemetric investigation of the effects of amateur flights on pilot's irritations, such as ECG variations, pulse frequency accelerations, or arrhythmias. Telemetric ECG recordings obtained during in-flight measurements of 23 healthy pilots during normal, abnormal, and artistic flight conditions are presented, discussed, and analyzed. O.H.

A71-13065 **Telemetric ECG tests during work under an anomalous heat stress (Telemetrische Ekg-Untersuchungen bei Arbeiten unter abnormer Hitzebelastung).** R. Hauf (Freiburg, Gewerbeaufsichtsamt, Freiburg, West Germany), D. Ohmann, and H. Ohmann. In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 87-91. In German.

Discussion of telemetric ECG tests carried out in human subjects working in a spinning mill under a heat stress for periods up to eight hours. The techniques and equipment which made these continuous recordings possible are described. The ECGs obtained are examined and analyzed. O.H.

A71-13066 **Biotelemetry and computer analysis of electrocardiograms.** P. J. Amlinger (Missouri, University, Columbia, Mo.). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 126-141. 12 refs.

Discussion of the current status of electronic processing of ECG telemetric data. A detailed description is presented of the Computer ECG Project of the University of Missouri, in which ECG signals recorded in physicians' offices or hospitals in various parts of the State of Missouri are transmitted to the University's Computer Center where, after analog-to-digital conversion, they are processed and analyzed by the computer. The performance of this system is discussed and evaluated. O.H.

A71-13067 **The importance of EEGs for aviation medicine, with particular regard to telemetered inflight recordings (Die Bedeutung des EEG für die Flugmedizin mit besonderer Berücksichtigung telemetrierter inflight-Ableitungen).** J. C. Aschoff (Medizinisch-Naturwissenschaftliche Hochschule, Ulm, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 154-163. 20 refs. In German.

Discussion of the importance of telemetered inflight EEG recordings for examining the pilots' mental stress response and flying aptitude. The methods developed by Sem-Jacobsen which make it possible to correlate the pilot's flying aptitude with the EEG are described. Using an eight-channel EEG equipment, inflight tests were carried out by telemetry on jet pilots as well as personnel with no previous flight experience during a standardized flight schedule. Results show that the jet pilots' brains are sometimes stressed beyond tolerance or limit for adequate functioning. 'Pilot errors' are therefore shown to be often due to physical and mental overstressing. On the basis of inflight EEG tracings, the pilots tested were divided into groups according to their responses recorded. The records strongly suggest a close correlation between inflight EEG changes and the pilots' flying aptitude. It is therefore suggested that inflight EEG may improve the selection of jet pilots and reduce accidents due to 'pilot error.' O.H.

A71-13068 **Telemetry of ventilatory volumes (Telemetrie von Atemgrössen).** H. Drasche (Saarland, Universität, Saarbrücken, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 164-180. 36 refs. In German.

Discussion of the currently used techniques for telemetering respiratory parameters in man. A brief outline of the developments in this field is first presented. It is shown that, according to the present level of experience, telemetry of respiration, and particularly telemetry of static and dynamic ventilatory volumes, must be considered as a problem of development of suitable transducers. A survey is given of the various systems of existing transducers and the methods of telemetry of ventilation based on the use of these transducers as described in the literature, including the author's own experience with two telemetry systems developed or improved in close cooperation with industry. An analysis of the performance of these methods is made showing that the ideal and generally acceptable method still has to be developed. O.H.

A71-13069 **Application of new semiconductor elements for signal transmission in telemetry of blood pressure data (Anwendung neuer Halbleiterbauelemente für die Signalübertragung in der Blutdrucktelemetrie).** R. Zerzawy and K. Bachmann (Medizinische Universitätsklinik, Erlangen, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 202-209. 6 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft.

Description of two new electronic devices utilizing new integrated semiconductor elements for use in telemetry of direct continuous blood pressure measurements. The first is a portable telemetry preamplifier which uses integrated operational amplifiers and guarantees a temperature drift less than 0.1 mm Hg/deg C. The second is a pulse-to-pulse mean pressure integrator which is designed on the base of integrated circuits and MOS field-effect transistors and makes it possible to reproduce fast mean pressure changes and to limit the recovery time to one pulse period. O.H.

A71-13070 **Wireless blood pressure telemetry (Drahtlose Blutdrucktelemetrie).** K. Bachmann (Medizinische Universitätsklinik, Erlangen, West Germany). In: Biotelemetry; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings (Biotelemetrie; Symposium, Erlangen, West Germany, November 29, 30, 1968, Proceedings). (A71-13058 03-05) Edited by Ludwig Demling and Kurt Bachmann. Stuttgart, Georg Thieme Verlag, 1970, p. 210-219. 11 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft.

Discussion of direct continuous radiotelemetry of blood pressure. Following an outline of the problems associated with the existing methods of blood pressure measurement, direct methods of measurement, in particular, the direct continuous radiotelemetry method, are described and evaluated. Several results obtained in radiotelemetric measurements described in the literature are reviewed. Finally, trends in medical telemetry are discussed. O.H.

A71-13093 **Medicophysiological problems posed by SSTs (Introduction) (Les problèmes médico-physiologiques posés par les transports supersoniques /Introduction/).** Raboutet. *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 2nd Quarter, 1970, p. 63, 64. In French.

Discussion of medical and physiological problems created by the SST, the most significant of which stem from the cruising altitude and the aircraft's speed. Special materials used and special features built into the design of the Concorde to forestall the risks presented by cosmic radiation, the presence of ozone in the atmosphere, explosive decompression, the loss of a wing, as well as the high temperatures caused by the speed of Mach 2.2 are described, and comparisons are made with the problems faced by the American SST. It is pointed out that all medicophysiological problems connected with the Concorde have been solved. M.M.

A71-13094 **Air conditioning in the SST (Au sujet de la climatisation dans les T.S.S.).** R. Lemaire (Caen, Université, Caen, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 2nd Quarter, 1970, p. 65-69. In French.

Discussion of problems connected with the air conditioning of supersonic transports. Environmental factors of the passenger cabin of a supersonic aircraft are discussed, together with heat exchanges due to radiation, convection, and evaporation. The air conditioning problems of supersonic aircraft have been solved by establishing a temperature close to 20 C, a moisture index ranging around 50 per cent, and an air movement of less than 1 m/sec. M.M.

A71-13095 **Evaluation of tolerance in the event of air conditioning failure in the SST (Evaluation de la tolérance en cas de panne de climatisation des T.S.S.).** J. Timbal (Ministère des Armées, Service de Santé des Armées, Paris, France) and C. Boutelier (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Bretigny-sur-Orge, Essonne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 2nd Quarter, 1970, p. 71-73. 7 refs. In French.

Brief study of heat tolerance in the event of a breakdown in the air conditioning system of the SST. The results obtained show that, for a resting subject, a breakdown in the air conditioning system in the passengers' cabin of a supersonic aircraft flying at high altitude will not pose a serious problem as long as the temperature remains below 42 C, as the evaporating power of the cabin atmosphere will maintain the heat balance. M.M.

A71-13096 **Ozone, altitude and biochemistry (Ozone, altitude et biochimie).** P. L. Biget, A. Vauzelle, and R. Breton. *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 2nd Quarter, 1970, p. 74-78. 33 refs. In French.

Brief review of investigations of ozone concentration in the atmosphere, ozone dissociation in the air conditioning systems of the SST, and the biochemical effects of ozone poisoning. Interesting data have been obtained regarding the connection between ozone concentration and the temperature factor as well as the connection between ozone and solar activity. When air from the jets is used for air conditioning, ozone dissociation is complete during ascent and cruising height. Attention must be paid to possible ozone concentration in the cabin during descent. The biochemical data obtained are only preliminary. M.M.

A71-13097 **Animal reactions to sonic boom (Réactions animales au bang sonique).** C. Boutelier (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Essonne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 2nd Quarter, 1970, p. 79-81. 7 refs. In French.

Description of the results of investigations of the behavior of French army dogs subjected to booms of high intensity and relative frequency. The results obtained showed that sonic boom affects heart rate only slightly. This result is comparable to the result obtained in men (operation Jéricho-Virage, 1967). On the other hand, the effect on behavior and conditioning is not at all negligible. M.M.

A71-13098 **Supersonic transports, physiopathological and otolaryngological repercussions (Les transports supersoniques, incidences physiopathologiques en oto-laryngologie).** R. Bertoni. *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 2nd Quarter, 1970, p. 82, 83. In French.

Discussion of the following specific aspects of the effects of supersonic flight on the auditory system: (1) spatial disorientation, and sensorial illusions of labyrinthine origin; (2) repercussions of supersonic flight on passengers having intra-auricular prosthesis; and (3) effects of supersonic boom on the auditory system. Psychological factors connected with the reaction to supersonic bang are briefly examined. M.M.

A71-13115 # **Automatic analysis of spatial vectorcardiograms (Automatyczna analiza wektokardiogramów przestrzennych).** H. Kowarzyk, J. Jagielski, M. Gierońska-Zasadzieniowa, R. Wrona (Państwowy Szpital Kliniczny Nr. 1; Wrocław, Uniwersytet, Wrocław, Poland), and J. Wańczyk. *Zastosowania Matematyki,* vol. 11, no. 2, 1970, p. 119-129. 19 refs. In Polish.

Description of a method for comparing two vectorcardiograms recorded with different electrode lead arrangements or with different amplification systems. The method involves calculation of the correlation coefficient between the coordinates of spatial points obtained from electrocardiographic measurements. An affine transformation is performed prior to the calculation of the correlation coefficient in order to account for the different lead systems. A computer program developed for the operation is described. T.M.

A71-13151 **Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969.** Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970. 364 p. $15.

Contents:

Foreword. C. D. Leake (California, University, San Francisco, Calif.), p. v-vii.

Preface. B. L. Welch (Johns Hopkins University, Baltimore, Md.), p. ix, x.

Introduction - Noise in our overpolluted environment. J. R. Anticaglia (U.S. Public Health Service, Cincinnati, Ohio), p. 1-3.

Adaptation.

Environmental noise, 'adaptation' and pathological change. B. L. Welch (Johns Hopkins University, Baltimore, Md.), p. 5, 6.

Resistance to disease.

Audiogenic stress and susceptibility to infection. M. M. Jensen and A. F. Rasmussen, Jr. (California, University, Los Angeles, Calif.), p. 7-19. 28 refs. (See A71-13152 03-04)

Endocrine and metabolic function.

Effects of sound on endocrine function and electrolyte excretion. M. F. Lockett (Western Australia, University, Nedlands, Australia), p. 21-41. 77 refs. (See A71-13153 03-04)

Endocrine and metabolic effects of noise in normal, hypertensive and psychotic subjects. A. E. Arguelles, M. A. Martinez, E. Pucciarelli, and M. V. Disisto (Hospital Aeronáutico, Buenos Aires; Scientific Research Committee of the Argentine, Argentina), p. 43-55. 17 refs. (See A71-13154 03-04)

Cardiovascular.

Noise, hearing and cardiovascular function. S. Rosen, p. 57-66. 11 refs. (See A71-13155 03-04)

Relation between temporary threshold shift and peripheral circulatory effects of sound. G. Jansen (Ruhr Universität, Bochum, West Germany), p. 67-74. 14 refs. (See A71-13156 03-04)

Cardiovascular and biochemical effects of chronic intermittent neurogenic stimulation. J. P. Buckley and H. H. Smookler (Pittsburgh, University, Pittsburgh, Pa.), p. 75-84. 22 refs. (See A71-13157 03-04)

Cardiovascular and teratogenic effects of chronic intermittent noise stress. W. F. Geber (Georgia, Medical College, Augusta, Ga.), p. 85-90.

Reproductive.

Effect of noise during pregnancy upon foetal viability and development. A. Árvay (Debreceni Orvostudományi Egyetém, Debrecen, Hungary), p. 91-115.

Audiogenic stimulation and reproductive function. I. Tamari (Hebrew University, Jerusalem, Israel), p. 117-130.

Effect of noise during pregnancy upon foetal and subsequent adult behavior. L. W. Sontag (Fels Research Institute, Yellow Springs, Ohio), p. 131-141.

Neurological.

Extra-auditory effects of sound on the special senses. J. R. Anticaglia (U.S. Public Health Service, Cincinnati, Ohio), p. 143-150. 8 refs. (See A71-13158 03-04)

Human studies of epileptic seizures induced by sound and their conditioned extinction. F. M. Forster (Wisconsin, University, Madison, Wis.), p. 151-158.

The functional state of the brain during sonic stimulation. L. V. Krushinskii, L. N. Molodkina, D. A. Fless, L. P. Dobrokhotova, A. P. Steshenko, A. F. Semiokhina, Z. A. Zorina, and L. G. Romanova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 159-183. 88 refs. (See A71-13159 03-04)

Acoustic priming of audiogenic seizures in mice. K. R. Henry and R. E. Bowman (Wisconsin, University, Madison, Wis.), p. 185-201. 12 refs. (See A71-13160 03-04)

Genetic and temporal characteristics of audiogenic seizures in mice. J. L. Fuller and R. L. Collins (Jackson Laboratory, Bar Harbor, Me.), p. 203-210. 15 refs. (See A71-13161 03-04)

Influence of age, auditory conditioning, and environmental noise on sound-induced seizures and seizure threshold in mice. G. B. Fink (Oregon State University, Corvallis, Ore.) and W. B. Iturrian (Georgia, University, Athens, Ga.), p. 211-226. 21 refs. (See A71-13162 03-04)

Biochemical and pharmacological.

Psychopharmacology of the response to noise, with special reference to audiogenic seizure in mice. A. G. Lehmann, p. 227-257. 66 refs. (See A71-13163 03-04)

Neurochemical factors in auditory stimulation and development of susceptibility to audiogenic seizures. P. Y. Sze (Connecticut, University, Storrs, Conn.), p. 259-269. 16 refs. (See A71-13164 03-04)

Sleep.

Effects of noise during sleep. G. J. Thiessen (National Research Council of Canada, Ottawa, Canada), p. 271-275.

Auditory stimulation, sleep loss on the EEG stages of sleep. H. L. Williams (Oklahoma, University, Oklahoma City, Okla.), p. 277-281.

Studies of the effects of sonic booms from supersonic aircraft.

Awakening effects of simulated sonic booms and subsonic aircraft noise. J. S. Lukas and K. D. Kryter (Stanford Research Institute, Menlo Park, Calif.), p. 283-293. 8 refs. (See A71-13165 03-05)

Effects of noise on the physiology and behavior of farm-raised animals. J. Bond (U.S. Department of Agriculture, Beltsville, Md.), p. 295-306. 12 refs. (See A71-13166 03-04)

Effect of sonic booms on the hatchability of chicken eggs and other studies of aircraft-generated noise effects on animals. J. M. Heinemann (USAF, Environmental Health Laboratory, Kelly AFB, Tex.), p. 307.

Man and sonic boom - Environmental change. C. W. Nixon (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio), p. 309-331. 20 refs. (See A71-13167 03-05)

Appendix - Current sonic boom research in France. J. E. Dubois, p. 333-336.

Summary.

Summary of the symposium. C. D. Leake (California, University, San Francisco, Calif.), p. 337-340.

Appendix - Supplementary references, p. 341-349.

Author index, p. 351-359.

Subject index, p. 361-365.

A71-13152 Audiogenic stress and susceptibility to infection. Marcus M. Jensen and A. F. Rasmussen, Jr. (California, University, Los Angeles, Calif.). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 7-19. 28 refs. PHS Grant No. 5 T1-MH-6415.

Summary of research in which sound was used as the inducer of stress response in mice. Comparison is made with results obtained with avoidance-learning stress. Data are presented on the influences of audiogenic stress on physiologic responses, on changes in susceptibility to both cyto-destructive and oncogenic virus infections, and on host defense mechanisms. F.R.L.

A71-13153 Effects of sound on endocrine function and electrolyte excretion. Mary F. Lockett (Western Australia, University, Nedlands, Australia). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 21-41. 77 refs.

Review of studies of the effects of sound on endocrine function and electrolyte excretion in various animals and in man. Attention is given to the effects of sound on adenohypophyseal function, the relationship between sound, endocrines, and hypertension, sound and thyroid function, and the influence of sound on neurohypophyseal function. Experiments are described which were designed as a series of crossover tests in which each animal served as its own control. Female rats were used to determine the mechanism of the diuresis and natriuresis caused by thunder. F.R.L.

A71-13154 Endocrine and metabolic effects of noise in normal, hypertensive and psychotic subjects. A. E. Arguelles, M. A. Martinez, Eva Pucciarelli, and Maria V. Disisto (Hospital Aeronáutico, Buenos Aires; Scientific Research Committee of the Argentine, Argentina). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 43-55. 17 refs.

Investigation of whether abnormal responses to sound exposure are reflected in the catecholamines and corticoid hormone patterns of patients with abnormal circulatory conditions such as cardiac infarction and hypertension, as well as those of some psychiatric patients. Results indicate that cardiac infarction patients react to audiogenic stress with increased release of norepinephrine because of a more active aggressive psychological personality. Significant epinephrine and norepinephrine responses to sound stimulation were also present in normal subjects and hypertensives. Some schizophrenics with noise exposure showed very high levels of urine norepinephrine although they were under large doses of chlorpromazine. F.R.L.

A71-13155 Noise, hearing and cardiovascular function. Samuel Rosen. In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 57-66. 11 refs.

Study of peripheral vasoconstriction recorded plethysmographically. This vasoconstriction occurs independent of annoyance or any other emotion, and is present with each noise stimulus and at all intervals. A meaningless white noise at 90 dB sound pressure level (SPL) produced the same degree of vasoconstriction in persons long accustomed to such noise as it did in those unaccustomed to it. Various studies are reported which seem to emphasize the noxious effects of noise on man and animals. F.R.L.

A71-13156 **Relation between temporary threshold shift and peripheral circulatory effects of sound.** Gerd Jansen (Ruhr Universität, Bochum, West Germany). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 67-74. 14 refs.

Attempt to find the quantitative relation between temporary threshold shift (TTS) and vegetative reactions (VR). As an indicator of the VR, the changes of the blood volume at the fingertip, as measured with a strain gauge, finger-pulse-amplitude (FPA) was used. Various experiments are cited which lead to the conclusion that TTS and FPA are influenced by the nervous system, and that noise changes the VR in the direction of sympathicotonus. F.R.L.

A71-13157 **Cardiovascular and biochemical effects of chronic intermittent neurogenic stimulation.** Joseph P. Buckley and Harold H. Smookler (Pittsburgh, University, Pittsburgh, Pa.). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 75-84. 22 refs.

Results of studies undertaken to obtain a detailed understanding of the time course of certain biochemical processes that occur during prolonged exposure to intermittent neurogenic stimulation, and to correlate these effects with certain physiological alterations of the cardiovascular system. Rats were subjected to a combination of audiogenic, visual, and motion stimuli in an attempt to better understand the physiological, biochemical, and endocrinological sequence of events which may contribute to the development of environmentally induced diseases. Hypertension was consistently induced. Such tranquilizers as reserpine and chlorpromazine not only failed to prevent the effects of chronic exposure to variable stressors, but markedly accented their lethal effects. It is suggested that alphamethyltyrosine may be a valuable therapeutic agent if used in the very early stages of essential hypertension. F.R.L.

A71-13158 **Extra-auditory effects of sound on the special senses.** Joseph R. Anticaglia (U.S. Public Health Service, Bureau of Occupational Safety and Health, Cincinnati, Ohio). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 143-150. 8 refs. PHS Grant No. BO-3360.

Review of the effects of sound (and noise) upon the sensory processes, and its use as an audioanalgesic. Evidence is presented to show that noise can adversely affect certain visual functions, induce nystagmus and vertigo, disrupt equilibrium, and influence the galvanic skin response. Possible mechanisms of such effects are discussed. F.R.L.

A71-13159 **The functional state of the brain during sonic stimulation.** L. V. Krushinskii, L. N. Molodkina, D. A. Fless, L. P. Dobrokhotova, A. P. Steshenko, A. F. Semiokhina, Z. A. Zorina, and L. G. Romanova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 159-183. 88 refs.

Results of an investigation to describe various types of compulsive seizures developing under the action of an acoustic stimulus. The physiological mechanisms of these seizures are examined, and the pathological consequences of reflex epileptical seizures in rats are established. The protective brain mechanisms which prevent or weaken the convulsive reactions to sonic stimulations and their consequences are investigated. The material discussed is predominantly based on laboratory studies conducted since 1947. F.R.L.

A71-13160 **Acoustic priming of audiogenic seizures in mice.** Kenneth R. Henry and Robert E. Bowman (Wisconsin, University, Madison, Wis.). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 185-201. 12 refs.

Discussion of the 'acoustic priming' effect, which represents a new phenomenon which may be useful in seizure research, especially if a similar effect is observed in man. A series of continuing experiments designed to examine the priming effect are described. By merely exposing a juvenile mouse to 30 sec of intense sound, a high degree of susceptibility to sound-produced convulsions can be induced. F.R.L.

A71-13161 **Genetic and temporal characteristics of audiogenic seizures in mice.** John L. Fuller and Robert L. Collins (Jackson Laboratory, Bar Harbor, Me.). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 203-210. 15 refs. NIH Grant No. MH-11327.

Review of some of the temporal aspects of vulnerability of mice to audiogenic seizures, followed by a discussion of genetics. Susceptibility varies with age and with previous exposure to sound at a critical age. Induced seizure in some strains may last for months. Genetic studies must take into account the temporal pattern of audiogenic seizure susceptibility and the difference between induced and natural susceptibility. Although many genes influence the trait, it has been possible to identify a specific locus which plays a major role in producing natural susceptibility. F.R.L.

A71-13162 **Influence of age, auditory conditioning, and environmental noise on sound-induced seizures and seizure threshold in mice.** Gregory B. Fink (Oregon State University, Corvallis, Ore.) and W. B. Iturrian (Georgia, University, Athens, Ga.). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 211-226. 21 refs.

Consideration of the characterization of the audioconditioned convulsive response (ACCR), of some factors that influence it, and of the use of electroshock and chemoshock procedures for comparison and interpretation. The CF No. 1 strain of mice was selected for study, since it is a widely used strain known to be not susceptible ordinarily to sound-induced seizures, and to have a low death rate following maximal electroshock seizures. The ACCR offers seizures of predictable incidence and severity without the use of genetically susceptible strains, special diets, chemicals, or surgical manipulation. F.R.L.

A71-13163 **Psychopharmacology of the response to noise, with special reference to audiogenic seizure in mice.** Alice G. Lehmann. In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 227-257. 66 refs.

Consideration of the effect of noise on the central nervous system of man as well as that of animals. These harmful effects may even induce convulsions, but their physiology is not well known. The audiogenic seizure in mice is a good test for the screening of drugs counteracting the harmful effects of noise on the nervous system. Among the numerous efficient drugs, some are atypical nervous sedatives, while others act on specific metabolisms. A study of the latter can lead to a better knowledge of mechanisms involved in the harmful effects of noise. It appears that the central nervous system and the sympathetic nervous system may both be affected by loud noises, and that serotonin, norepinephrine, and gamma-aminobutyric acid metabolisms are involved in the reaction to noise. F.R.L.

A71-13164 **Neurochemical factors in auditory stimulation and development of susceptibility to audiogenic seizures.** Paul Y. Sze (Connecticut, University, Storrs, Conn.). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 259-269. 16 refs. Research supported by the Illinois Department of Mental Health; NIH Grant No. MH-03361.

Outline of a study of neurochemical changes that occur developmentally following primary auditory stimulation in the study of audiogenic seizures. The intent is to better understand the neural basis of priming. Mice used in the reported experiments were from the inbred C57BL/6 strain. If induction of the development of seizure susceptibility by sound is viewed in the broad sense as a long-term modification of behavior by sensory input, the causal involvement of gamma-aminobutyric acid (GABA) following the auditory input is of particular interest. F.R.L.

A71-13165 * **Awakening effects of simulated sonic booms and subsonic aircraft noise.** Jerome S. Lukas and Karl D. Kryter (Stanford Research Institute, Menlo Park, Calif.). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 283-293. 8 refs. Contracts No. NAS 1-6193; No. NAS 1-7592.

Description of a simulator of sonic booms as they would be experienced in houses under the flight path of a supersonic aircraft, as well as of research on the effects of these simulated booms upon sleeping humans. The boom intensities used in this study are comparable to those to be found inside a house located under, and at a distance of approximately 25 mi, to the side of the flight path of proposed supersonic transports during cruise. There appeared to be little adaptation to the booms, but some adaptation to subsonic aircraft noise. F.R.L.

A71-13166 **Effects of noise on the physiology and behavior of farm-raised animals.** James Bond (U.S. Department of Agriculture, Agricultural Research Service, Beltsville, Md.). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 295-306. 12 refs.

General review of literature on sound effects on farm animals, and of specific studies conducted by the personnel of the Animal Husbandry Research Division. Milk production in dairy cows has been shown to be adversely affected by sudden noises, but in studies with noise resulting from jet aircraft or sonic booms there was no evidence of an effect on milk production. It has been observed that unusual noises and disturbances may cause kit losses in mink. No harmful effects to mink were observed that could be attributed to exposure of the mink to the simulated sonic booms. Reproduction in both the boomed and not boomed groups could be considered normal. F.R.L.

A71-13167 **Man and sonic boom - Environmental change.** Charles W. Nixon (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Physiological effects of noise; Proceedings of the International Symposium on the Extra-Auditory Physiological Effects of Audible Sound, Boston, Mass., December 28-30, 1969. (A71-13151 03-04) Symposium sponsored by the Friends of Psychiatric Research, Inc. Edited by B. L. Welch and A. S. Welch. New York, Plenum Press, 1970, p. 309-331. 20 refs.

Review of studies of human response, both physiological and psychological, to sonic boom exposures conducted in France, the U.K., and the U.S., considering them in terms of present foundations for criteria for sonic boom acceptability. The probability of immediate direct physiological injury is essentially zero. Startle occurs in response to the sonic boom, and some adaptation is observed with repeated exposure. Sleep interference from nighttime booms, which may be a major determinant of public reaction, was observed for simulated sonic booms in excess of 1.0 lb/sq ft, for which adaptation did not occur during the test period. Comparative judgments of the relative annoyance of sonic booms and aircraft noise are in good agreement, and form a basis for considering the acceptability of sonic boom exposures in terms of composite noise rating (CNR). Sonic booms from fully operational SST schedules of present configuration vehicles flying over the U.S. several times per route per day would likely result in widespread action against the boom and its source. It is considered that, at present, a decision to fly over water and not land is a wise one. F.R.L.

A71-13180 **Numerical study of oxygen uptake by layers of hemoglobin solution.** Howard Kutchai (Michigan, University, Ann Arbor, Mich.; Oslo, University, Oslo, Norway). *Respiration Physiology,* vol. 10, Oct. 1970, p. 273-284. 23 refs. NIH Grants No. 5 T1 GM-892-07; No. F O2 HE-42933-01.

Numerical solution of the equations describing O2 uptake by layers of concentrated hemoglobin solution 0.25, 0.5, 1, 1.6, 2, 3.6, 5, 10, and 20 microns thick. The results indicate that the diffusion of oxyhemoglobin has almost no effect on the rate of oxygenation of the 0.25-micron layer, but its influence increases with increasing layer thickness, so that it shortens the time required to reach 50% saturation in the 1.6-micron layer by 23% and in the 5-micron layer by 34%. For the 1.6-micron layer, which might be considered a model red blood cell, the results suggest that the rate at which O2 reacts with hemoglobin is of primary importance early in the uptake process, but that later the diffusion of O2 into the deeper parts of the layer becomes rate-limiting. (Author)

A71-13181 **Displacement of oxygen dissociation curves and red cell cation exchange in chronic hypercapnia.** Karl E. Schaefer, Arthur A. Messier, and Carolyn C. Morgan (U.S. Navy, Submarine Medical Research Laboratory, Groton, Conn.). *Respiration Physiology,* vol. 10, Oct. 1970, p. 299-312. 29 refs.

Experimental investigation of the oxygen dissociation curve in chronic hypercapnia in guinea pigs and rats. Commensurate with the

increase and decrease in oxygen affinity, cation concentrations of the red cells exhibited corresponding decreases and increases in both guinea pigs and rats. The potassium concentration showed a larger fall, while red cell sodium content increased slightly during the uncompensated phase of respiratory acidosis. These changes were reversed during the compensated phase of respiratory acidosis without returning to control levels. The pH gradients across the red cell measured in guinea pigs were found to decrease during the uncompensated phase of respiratory acidosis and to increase again during the compensated phase of respiratory acidosis. M.M.

A71-13182 A critical evaluation of a nitrogen rebreathing method for the estimation of PV sub O2. Alastair A. Spence and F. Richard Ellis. *Respiration Physiology,* vol. 10, Oct. 1970, p. 313-320. 9 refs.

A N2/CO2 rebreathing method for determining the mixed venous oxygen tension has been evaluated both theoretically, using a mathematical model, and experimentally. Oxygen tension equilibrium between blood and rebreathed gas depends on the oxygen carrying capacity of the blood and the pulmonary blood flow. Under most circumstances, these will be inadequate for the success of the technique. (Author)

A71-13183 Influence of the cyclical pattern of ventilatory flow on pulmonary gas exchange. Robert E. Nye, Jr. (Dartmouth College, Hanover, N.H.). *Respiration Physiology,* vol. 10, Oct. 1970, p. 321-337. 21 refs. Research supported by the American Heart Association and the New Hampshire Heart Association.

Investigation of the extent to which pulmonary gas exchange can be influenced by the way the pattern of air flow is disposed with respect to time during each breath. It was found that the size of the positive or negative alveolar dead space (VDalv) correlated negatively with the apneustic tendency of the respiratory pattern, as expressed by an Apneusis Index (A.I.). Patterns with comparable A.I. yielded comparable VDalv regardless of differences in the timing of inspiration and expiration or the presence of pauses. The effect was increased by increasing metabolic rate and by decreasing respiratory frequency or lung volume. M.M.

A71-13189 # Effect of the duration of sound stimuli on the brain analysing activity (Vliianie dlitel'nosti zvukovykh signalov na analizatornuiu deiatel'nost' mozga). V. N. Andreeva, Iu. G. Kratin, and Sh. Kurbanov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Sept. 1970, p. 1193-1207. 34 refs. In Russian.

EEG and behavioral responses were studied in cats. The shortening of sound duration down to 1.0-0.5 sec did not affect the behavior, but the general level of activation of the brain activity considerably increased and the electric responses to positive and fine-differentiate stimuli elongated; further shortening down to 0.2-0.1 sec enhanced the the above EEG changes and caused some disturbances in behavior: a prolonged successive inhibition and eventual failings in fine differentiation occurred (which, however, could be eliminated by training). The duration of 0.030-0.015 sec proved to be the utmost: the background EEG became sharply activated, desynchronization in response to every stimulus elongated, and the conditioned behavior disorganized in most animals; neurotic signs started to occur. This state could only be corrected by returning to sounds of initial duration. (Author)

A71-13190 # Physiological characteristics of the condition of the cerebrum and a muscle in the process of adaptation to high mountain conditions (Fiziologicheskie pokazateli sostoianiia golovnogo mozga i myshtsy v protsesse akklimatizatsii k usloviiam vysokogor'ia). A. A. Aidaraliev, V. A. Berezovskii, and M. D. Dzhunushev (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR; Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Sept. 1970, p. 1208-1214. 37 refs. In Russian.

Description of experiments in which the oxygen partial pressure, blood flow, redox potential and temperature variations were measured in the cerebrum and musculus gastrocnemius of 120 albino rats kept for periods of up to 60 days at an altitude of 3200 m above sea level in the Tien Shan mountains. In the cerebrum of the experimental rats the blood flow rates, redox potential and temperature increased, and the oxygen pressure decreased, during the first 15 days of adaptation and then recovered their normal values, while in the musculus gastrocnemius of the rats this trend was reversed. V.Z.

A71-13191 # Effect of acoustic stimulation on the electroretinogram of man (Vliianie zvukovoi stimuliatsii na elektroretinogrammu cheloveka). Veliu St. Gavriiski (Vissh Institut za Fizkultura, Sofia, Bulgaria). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Sept. 1970, p. 1215-1218. 41 refs. In Russian.

Description of experiments in which the changes in the electroretinograms of 28 male and female subjects were studied during the acoustic stimulation of their cortical auditory center. The effects of acoustic stimuli on certain specific functional parameters of the auditory system are described. The results are discussed in an attempt to determine the mechanisms of these changes vs the functional state of various sections of the cortex. V.Z.

A71-13192 # Physiological aspects of endurance during muscular activity (Fiziologicheskie aspekty vynoslivosti pri myshechnoi deiatel'nosti). N. N. Iakovlev (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Sept. 1970, p. 1263-1275. 70 refs. In Russian.

Review of biochemical, cytological, physiological and pharmocological studies carried out at the Leningrad Institute of Physical Culture and related to the physiology and chemistry of physical endurance and muscular activity of man. The development of physical endurance is viewed as an adaptation process depending on the biochemical and functional changes occurring in the organism during muscular activity. Data concerning the phases of adaptation to muscular activity and the effects of biologically active substances on adaptation are given. V.Z.

A71-13193 # Effect of muscular training on the heat stability of the human organism (Vliianie myshechnoi trenirovki na teplovuiu ustoichivost' organizma cheloveka). F. T. Agarkov and O. S. Pavlov (Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Sept. 1970, p. 1282-1287. 25 refs. In Russian.

Description of a total of 190 tests on 56 subjects in which the heat endurance of physically trained subjects was compared with that of control subjects by studying video-motor reactions, pulse rates, arterial pressure, muscular strength, physical performance, rectal and skin temperatures, pulmonary ventilation, oxygen consumption, carbon dioxide release and body weight in both groups of subjects during exposures to temperature extremes. The positive effect of physical training on the heat stability of the subjects is discussed. V.Z.

A71-13224 The autoregulation of the heart work by the coronary perfusion pressure. G. Arnold, C. Morgenstern, and W. Lochner (Düsseldorf, Universität, Düsseldorf, West Germany). *Pflügers Archiv,* vol. 321, no. 1, 1970, p. 34-55. 38 refs. Translation. Research supported by the Deutsche Forschungsgemeinschaft.

Experimental study of the coronary perfusion pressure, the performance of the heart and the homeometric autoregulation, carried out in intact dogs. In nine dog hearts an increase in coronary

perfusion pressure raised the peak pressure in the left ventricle and the maximum of dp/dt, while the left ventricular end diastolic pressure decreased. An enhancement of coronary perfusion pressure in six dog hearts increased the peak pressure in the left ventricle and the maximum of dp/dt; the left ventricular end diastolic filling pressure decreased. Ventricular function curves showing this coronary perfusion pressure-induced increase in heart performance are examined. It is found that the homeometric autoregulation of the heart can be explained to a certain part by the coronary perfusion pressure. There is no explanation, however, of the effect of the coronary perfusion pressure on heart performance. It is concluded that an increased coronary perfusion pressure distends the coronary arteries which increases myocardial fiber tension and heart performance. O.H.

A71-13225 The stimulation of hypothalamic neurones by changes in ambient temperature. R. F. Hellon (Medical Research Council, National Institute for Medical Research, London, England). *Pflügers Archiv,* vol. 321, no. 1, 1970, p. 56-66. 21 refs.

Study of unit activity recorded from the anteromedial hypothalamic area of sedated rabbits while ambient and hypothalamic temperatures were independently varied. Out of 202 neurones tested, 19 were found which responded in less than 1 min to rapid changes in ambient temperature of plus or minus 15 C. Thirteen neurones responded only to cooling, two only to warming, and four to both warming and cooling. For a given direction of temperature change, some units showed an accelerated firing rate, while others were slowed. It was possible to test eight of these cells which responded to ambient temperature changes for their sensitivity to hypothalamic temperature. Six of them were found to have this additional temperature response. The results support recent hypotheses of temperature regulation in that they show there is a convergence of thermal information from peripheral and central receptors at the level of the anterior hypothalamus. (Author)

A71-13235 # Glutaminase isoenzyme system of the brain mitochondrial fraction (O sisteme izoenzimov glutaminazy mitokhondrial'noi fraktsii mozga). V. S. Oganesian, G. Kh. Buniatian, L. L. Badalian, and K. S. Mikirtumova (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Voprosy Biokhimii Mozga,* no. 5, 1969, p. 5-16. 40 refs. In Russian.

Investigation of relationships between different glutaminase activators in the mitochondrial brain fractions of rabbits. It is found that N-acetyl-N-aspartic acid, N-acetyl-N-glutamic acid, and tyrosine significantly enhance the deamination of glutamine in the mitochondrial fraction. L-aspartic acid, phenylalanine, and tryptophan cause a small increase of glutamine deamination. The maximum increase of glutamine deactivation with the above substances is observed at pH 8.5 to 9. The presenee of phosphate increases the stimulating properties of these amino acids by several times. In this respect, bicarbonate is less effective. It is concluded that the deamination of glutamine is not controlled by individual isoenzymes but by an isoenzyme system where activities are coordinated through corresponding activators. T.M.

A71-13236 # Problem of the penetration of gamma-aminobutyric acid into the brain for different ways of administering it (K voprosu o proniknovenii gamma-aminomaslianoi kisloty v mozg pri razlichnykh putiakh ee vvedeniia). B. A. Kazarian and G. Kh. Buniatian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Voprosy Biokhimii Mozga,* no. 5, 1969, p. 47-60. 44 refs. In Russian.

Description of experiments conducted with dogs and rats to determine the mechanisms of gamma-aminobutyric acid (GABA) penetration through the blood-brain barrier. Intracarotid administration of GABA in dogs was accompanied by its enhanced content in the blood leaving the brain. Intraperitoneal administration in rats did not affect GABA contents in the whole brain, but for the first two minutes the amounts of free and bound GABA in the cerebral cortex were substantially reduced, returning to normal levels after about five minutes. For two minutes after intraperitoneal administration, an increase of the free GABA level was observed in the hypothalamus. The unchanged GABA levels in the brain observed by other authors are explained by enhanced release rates. T.M.

A71-13237 # Phospholipids of the hypothalamo-neurohypophysial system (Fosfolipidy gipotalamo-neirogipofizarnoi sistemy). A. A. Galoian, K. G. Manukian, R. M. Srapionian, and Zh. G. Abelian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Voprosy Biokhimii Mozga,* no. 5, 1969, p. 105-122. 62 refs. In Russian.

Experimental study of the phospholipid composition of general lipid extracts and water-soluble protein fractions of the hypothalamo-neurohypophysial system of cattle. It is shown that the overall phospholipid content in the hypothalamus is three times greater than in the neurohypophysis. The phospholipid composition of the hypothalamus was very similar to that of cerebral white matter, while the neurohypophysis resembled grey matter. The neurohypophysis contains no X-phosphatide, which is characteristic of nerve tissue, and has very little polyphosphoinositides. One eighteenth of all the phospholipids of the total lipid extract are bound to the water soluble proteins of the hypothalamus, while only one thirteenth are bound to the water soluble proteins of the neurohypophysis. The water soluble protein fractions of the hypothalamo-neurohypophysial system contain all the basic phospholipids found in overall brain lipid extracts, but in somewhat different compositions. T.M.

A71-13238 # Dynamics of changes in the phospholipid level of blood entering and leaving the brain during unilateral desympathectomy in dogs (Dinamika izmenenii v urovne fosfolipidov v krovi, pitaiushchei golovnoi mozg i ottekaiushchei ot nego pri odnostoronnei desimpatizatsii u sobak). K. G. Karagezian and L. M. Ovsepian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Voprosy Biokhimii Mozga,* no. 5, 1969, p. 123-132. 32 refs. In Russian.

Investigation of changes in the arteriovenous difference of lipid phosphorus content caused by unilateral extirpation of the superior cervical ganglion of dogs. Three months after the operation, the levels of individual phospholipids in blood coming from both intact and sympathectomized halves of the brain and in samples taken from the carotid artery become stabilized below normal levels. The phosphorus levels of sphingomyelins and ethanolamine phosphatides remain near normal. There is a relative increase of the specific density of acid phospholipids with respect to the total sum of phospholipids of the whole blood. The results obtained testify to the important regulatory role of the sympathetic nervous system in the function of biologic filters in the brain. T.M.

A71-13239 # Effect of aminooxyacetic acid on the brain serotonin. A. R. Armenian and N. A. Esaian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Voprosy Biokhimii Mozga,* no. 5, 1969, p. 147-152. 13 refs. In Armenian, with abstract in English.

Investigation of the effects of increased gamma-aminobutyric acid (GABA) levels on the serotonin contents in the midbrain and in the pons-medulla oblongata region following the intraperitoneal administration of a GABA transaminase inhibitor (aminooxyacetic acid). The results obtained demonstrate the effects of GABA on brain monoamines and indicate that they may be responsible for the physiological role of GABA in the brain. T.M.

A71-13240 # **Energy metabolism in the brain of vertebrates (Energeticheskii obmen mozga pozvonochnykh).** R. A. Tigranian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Voprosy Biokhimii Mozga,* no. 5, 1969, p. 181-199. 218 refs. In Russian.

Survey of recent literature concerning bioenergetics of the brain in vertebrates. The main features of the energy metabolism are discussed for the brain as a whole, and particular aspects of the oxidative metabolism are delineated for several individual brain elements. Much attention is devoted to a comparison of the intensity of oxidative processes in neurones and glia. The effectiveness of various substrates acting on oxidative processes in brain tissue is evaluated, and structural details of the brain mitochondria are described. T.M.

A71-13293 # **Interrelationship between catecholamines of the hypothalamus and adrenal glands in the case of hypophysectomy (Vzaimootnosheniia katekholaminov gipotalamusa i nadpochechnikov pri gipofizektomii).** R. N. Shchedrina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 194, Sept. 11, 1970, p. 475-477. 7 refs. In Russian.

Study (performed with pseudo-operated, hypophysectomized, and control rats) showing that hypophysectomized animals with a low level of adrenaline formation and secretion do not respond by hormone discharge from the gland (and the associated increase in the adrenaline content of the blood) to the action of a stimulant, as is the case with pseudo-operated and control animals. This indicates that only a well functioning system composed of the hypothalamus, hypophysis, and adrenal glands can make the catecholamines of adrenal glands participate in the response of the organism to the action of stimulants. V.P.

A71-13325 **The outstanding jet pilot.** Roger F. Reinhardt. *(American Psychiatric Association, Annual Meeting, 123rd, San Francisco, Calif., May 11-15, 1970.) American Journal of Psychiatry,* vol. 127, Dec. 1970, p. 732-736. 16 refs.

A study of 105 superior jet pilots aged 20 to 40 years revealed that most were firstborn children with unusually close father-son relationships. They were self-confident, showed a great desire for challenge and success, were not introspective, and tended toward interpersonal and emotional distance. The author cites implications for population control and small families. He feels that we should give more attention to the significance of birth order and specific parental influence in regard to other groups. (Author)

A71-13328 **The normal pericardium.** Joseph P. Holt (Louisville, University, Louisville, Ky.). *American Journal of Cardiology,* vol. 26, Nov. 1970, p. 455-465. 85 refs. Research supported by the Kentucky, Louisville, and Jefferson County Heart Associations and PHS.

Discussion of the anatomy and function of the normal pericardium taking into account also the effect of removal of the pericardium. Under normal conditions the pericardium, with its fluid, lubricates the moving surfaces of the heart, holds the heart in a fixed geometric position and isolates the heart from other structures in the thorax, thus preventing adhesions and spread of infection. Seven functions of the pericardium are described. The pericardial pressure in mammals and in fish and amphibians is discussed. G.R.

A71-13329 **The application of fiberoptic indicator-dilution technique to the assessment of myocardial function. II.** Paul G. Hugenholtz, Henry R. Wagner, and William H. Plauth, Jr. (Harvard University; Children's Hospital Medical Center, Boston, Mass.). *American Journal of Cardiology,* vol. 26, Nov. 1970, p. 490-504. 18 refs. NIH Grants No. HE-10436-01; No. HE-5310-08.

Discussion of the measurement of left ventricular end-diastolic volume and of the components indirectly reflecting the force-velocity-length relation, such as the ejection fraction and the end-systolic volume, in an effort to elucidate the interaction of these factors in patients with heart disease. Thirty-four patients with a variety of cardiac lesions underwent exercise or isoproterenol infusion. Cardiac output, stroke volume, the ejection fraction, end-diastolic and end-systolic volume, ventricular or systemic arterial pressures, or both, and resistance were determined at regular intervals. On the average, heart rate doubled in all patients; in those tested during exercise the oxygen consumption rose at least 3-fold. Two types of response were observed. It is concluded that when an increase in end-diastolic and end-systolic dimensions occurs in the face of unchanged or decreased 'after-load,' impaired myocardial reserve is present. G.R.

A71-13351 # **The medical applications of ultrasonics.** P. N. T. Wells (Bristol, University; United Bristol Hospitals, Bristol, England). *Reports on Progress in Physics,* vol. 33, pt. 1, 1970, p. 45-99. 271 refs. Research supported by the Medical Research Council, the Department of Health and Social Security (Health), and the Wates Foundation.

Review of the various applications of ultrasonic techniques in surgery, therapy, and diagnosis. The fundamental physical principles underlying ultrasonic techniques, the piezoelectric transducers used for ultrasound generation and detection, and the characteristics and methods of measurement of the ultrasonic field are explained. The acoustical properties of biological tissues are then discussed in terms of propagation velocity, characteristic impedance, and absorption. The effects produced by the interaction of ultrasonic waves with biological tissues are examined. Applications of ultrasonics in neurosurgery, vestibular surgery, physiotherapy, production of aerosols, and, in particular, clinical diagnosis are described in detail. O.H.

A71-13483 # **The influence of alpha- and beta-receptor blockers upon oxygen consumption of methemoglobin-containing erythrocytes (Der Einfluss von alpha- und beta-Rezeptorenblockern auf den Sauerstoffverbrauch methämoglobinhaltiger Erythrozyten).** R. Bluth and H. Banaschak (Berlin, Humboldt-Universität, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 25, no. 2, 1970, p. 225-232. 5 refs. In German.

Description of an experiment in which an increase in oxygen consumption of methemoglobin containing erythrocytes and of methemoglobin containing hemolysate was achieved by isoprenaline inhibited by alpha- and beta-receptor blocking drugs. Beta-receptor blockers proved superior to alpha-blockers in their inhibitory action. Propranolol was most effective among the substances used. Isoprenaline is supposed to catalyze redox processes of methemoglobin containing erythrocytes and of methemoglobin containing hemolysate with NAD playing a decisive part as coenzyme. Propranolol inhibited these speeded-up redox processes. (Author)

A71-13484 # **The electroretinogram of a frog exposed to ultraviolet light of about 366 nm (Das Elektroretinogramm des Frosches bei Einwirkung ultravioletten Lichtes um 366 nm).** H. Berger and K. H. Seidel (Jena, Universität, Jena, East Germany). *Acta Biologica et Medica Germanica,* vol. 25, no. 2, 1970, p. 243-250. 35 refs. In German.

The effectiveness of stimulation with ultraviolet light of about 366 nm is tested electroretinographically. The eye of the frog responds only to high intensities of irradiation. Since the stimulating light induces self-fluorescence of the lens and retina, it is supposed that the irritation is elicited indirectly. The UV-insensibility of the frog demonstrated earlier with other methods is thus corroborated. The indirect action of radiation is essentially increased by injection of fluorescein sodium solutions. The fluorescent light emitted by the

organic dye includes 3 wavelengths (527, 570 and 640 nm). The former two are well absorbed by the pigments of vision. As the fluorescein molecules cannot pass the retinal blood-tissue barrier, the fluorescence light is emitted from out of the vessels. The effect of fluorescein is dependent on concentration. (Author)

A71-13485 # **Investigations of the occurrence and significance of vasopressin and oxytocin in the cerebrospinal fluid and in blood for nervous functions (Untersuchungen über Vorkommen und Bedeutung von Vasopressin und Oxytozin im Liquor cerebrospinalis und Blut für nervöse Funktionen).** H. Unger and H. Schwarzberg (Medizinische Akademie, Magdeburg, East Germany). *Acta Biologica et Medica Germanica,* vol. 25, no. 2, 1970, p. 267-280. 21 refs. In German. Research supported by the Ministerium für Wissenschaft und Technik.

Experimental investigation of the effect exerted by vasopressin and oxytocin on reactions induced by the central nervous system. The influence of intracisternal injections of oxytocin and vasopressin on the respiratory frequency and the impulse activity of the nerves was tested in urethan-anesthetized rabbits. The antidiuretic activity in the blood and cerebrospinal fluid was determined by antidiuretic test on ethanol-anesthetized rats. The oxytocic activity in the blood and cerebrospinal fluid was detected by the rat uterus test. The results demonstrate that vasopressin and oxytocin can exert an influence on reactions induced by the central nervous system by attacking functionally important nuclear areas located close to the ventricle. O.H.

A71-13486 # **On the reaction between sodium nitrite and hemoglobin (Über die Reaktion zwischen Natriumnitrit und Hämoglobin).** G.-R. Jänig (Deutsche Akademie der Wissenschaften, Institut für Pharmakologie, Berlin, East Germany) and F. Jung (Berlin, Humboldt-Universität, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 25, no. 2, 1970, p. 355-358. In German.

Investigation of the mechanism of the autocatalytic character of methemoglobin formation by sodium nitrite. It is found that in absence of oxygen the conversion of nitrite with hemoglobin is no longer an autocatalytic process. The conversion rate is roughly the same as observed with ferrocyanide inhibition of the autocatalysis in the presence of O2; however, only half the amount of methemoglobin is formed. O.H.

A71-13487 **Longitudinal gradients in periarteriolar oxygen tension - A possible mechanism for the participation of oxygen in local regulation of blood flow.** Brian R. Duling and Robert M. Berne (Virginia, University, Charlottesville, Va.). *Circulation Research,* vol. 27, Nov. 1970, p. 669-678. PHS Grants No. HE-10384; No. HE-12792.

Description of the results of measurements, by means of oxygen microcathodes, of the oxygen tension (PO2) on the external surface of arterioles between 8 and 100 microns in diam in the suffused cheek pouch of hamsters and in the cremaster muscle of hamsters and rats anesthetized with pentobarbital and urethane. The results obtained are consistent with the hypothesis that oxygen diffuses from the precapillary vessels and that intravascular PO2 falls progressively along the resistance vessels. This finding suggests a possible mechanism for the involvement of O2 in local regulation of blood flow. M.M.

A71-13488 * **Phenomenon of the gap in atrioventricular conduction in the human heart.** Andrew L. Wit, Anthony N. Damato, Melvin B. Weiss, and Charles Steiner (U.S. Public Health Service Hospital, Staten Island, N.Y.). *Circulation Research,* vol. 27, Nov. 1970, p. 679-689. 19 refs. PHS Grants No. HE-11829; No. HE-12536; NASA Contract No. T-22146.

Study of the phenomenon of the gap in atrioventricular conduction in eight human subjects, using a catheter technique for recording electrical activity of the His bundle. Premature atrial stimuli were applied throughout the basic atrial cycle, either during sinus rhythm or atrial pacing. As the coupling interval between the basic (A sub 1) and premature (A sub 2) atrial depolarizations was decreased, a point was reached where A sub 2 was no longer conducted to the ventricles. The region of conduction block was localized distal to the His bundle. The interval between basic and premature His bundle depolarizations at which block occurred provided a value for the effective refractory period of the His-Purkinje system. If A sub 2 was then made to occur earlier in the basic cycle, a point was reached where conduction of the premature response to the ventricles resumed. When this occurred, conduction delay of A sub 2 in the atrioventricular node had increased to allow for recovery of excitability of the His-Purkinje system. The gap phenomenon could be abolished by decreasing the basic cycle length or by beta-receptor blockade, both of which prevented conduction block of A sub 2 in the His-Purkinje system. M.M.

A71-13489 **Protective role of increased myocardial glycogen stores in cardiac anoxia in the rat.** James Scheuer and S. William Stezoski (Pittsburgh, University, Pittsburgh, Pa.). *Circulation Research,* vol. 27, Nov. 1970, p. 835-849. 43 refs. PHS Grant No. HE-09727.

Experimental investigation in the isolated perfused rat heart of the possibility that increased glycogen stores might protect the heart against anoxia. The experimental results demonstrate that both marked and minor elevations in cardiac glycogen are associated with greater glycolytic reserve and improved mechanical resistance to anoxia. This appears to be mainly due to enhanced glycogenolysis and anaerobic adenosine triphosphate (ATP) production. M.M.

A71-13490 **Acquired bundle branch block in a healthy population.** Raphael F. Smith, David H. Jackson, J. Warren Harthorne, and Charles A. Sanders (Naval Aerospace Medical Institute, Pensacola, Fla.; Massachusetts General Hospital, Boston, Mass.). *American Heart Journal,* vol. 80, Dec. 1970, p. 746-751. 23 refs.

Examination of the clinical findings in a group of 29 naval aviators whose ECG's changed from a normal pattern to that of bundle branch block, with the aim to assess the risk attendant on this change. In this group, 22 had right bundle branch block, and 7 had left bundle branch block. Follow-up information was available for all members of the group and represented 101 patient-years of observation. Selective coronary angiography was done in seven men; coronary artery disease was noted in one patient, and six men had normal coronary arteries. Three men with bundle branch block had definite evidence of coronary disease and there has been one death due to this cause. In two men right bundle branch block appeared after chest trauma. In 24 of the men no disease was detected, and it is concluded that acquired bundle branch block is frequently associated with a good prognosis in the asymptomatic patient. O.H.

A71-13491 **A submaximal exercise electrocardiographic test as a method of detecting occult ischemic heart disease.** Richard D. Spangler, Marc J. Horman, Stephen W. Miller, Donald A. Rotenberg, Jason C. Birnholz, Roger L. Simmons, Edwin E. Westura, and Samuel M. Fox (Georgetown University Hospital, Washington, D.C.). *American Heart Journal,* vol. 80, Dec. 1970, p. 752-758. 26 refs.

Description of a multistage continuous treadmill exercise test which was designed as a model technique that could be used in screening high-risk populations for occult ischemic heart disease. A protocol was devised to achieve near maximal heart rates without physical exhaustion. Test results of the study population are compared with those of maximal exercise tests and the merits of such a protocol are discussed. O.H.

A71-13492 * **Pulsus alternans - Physiologic study by noninvasive techniques.** David H. Spodick (Lemuel Shattuck Hospital; Boston University, Boston; Tufts University, Medford, Mass.) and J. Raoul St. Pierre. *American Heart Journal,* vol. 80, Dec. 1970, p. 766-777. 30 refs. Grant No. NGR-22-012-006.

Experimental study of pulsus alternans by using noninvasive techniques for assessing cardiovascular function. Electrocardiograms, phonocardiograms, apexcardiograms, and carotid pulse curves were recorded simultaneously in four patients with pulsus alternans. Calculation of physiologic intervals of the cardiac cycle and appropriate indices demonstrated marked alternation in diastolic filling periods, preejection and isovolumic contraction periods, ejection times, and the ratios of preejection and isovolumic times to ejection times in the presence of an unchanging duration of mechanical systole and electromechanical interval. Substitution of ejection and isovolumic contraction times into three independent regression equations for stroke volume showed close agreement in the magnitude of stroke volume alternation between strong and weak beats. The findings were consistent with those of invasive techniques in human subjects and of experiments in muscle physiology. O.H.

A71-13500 **Man-machine projects at SRI.** David J. Hall (Stanford Research Institute, Stanford, Calif.). *International Journal of Man-Machine Studies,* vol. 2, Oct. 1970, p. 363-394. 16 refs.

Discussion of 17 projects in man-machine-graphics research and of the basic techniques developed in this field. Software and hardware aspects are considered, and some indications are given about trends that might be expected in the future. Some applications discussed are mass data reduction, text-manipulation, production scheduling, multivariate data analysis and graphic data presentation, speech synthesis, robot navigation strategy, meta-compiler systems and high-level-language design for interactive displays. G.R.

A71-13522 # **Age peculiarities of electric impulsation of aortic and sinus nerves (Vikovi osoblivosti elektrichnoi impul'satsii aortal'nogo ta sinusnogo nerviv).** I. V. Shchogoleva (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Sept.-Oct. 1970, p. 621-626. 12 refs. In Ukrainian.

In experiments on 28 adult (8-12 month) and 25 old (3.5-4.5 years) rabbits afferent impulsation of aortic and sinus nerves was studied with ligature of carotid artery and under the effect of adrenalin and nicotine. Simultaneous registration of electric activity of the aortic nerve and blood pressure with ligature of carotid arteries showed that in old animals transition of volley impulsation of the aortic nerve into continuous one arises at a higher level of pressure than in young ones. At the same time when influenced with chemical stimuli, old animals prove to be more sensitive than young ones: impulsation intensification in afferent nerves under the effect of adrenalin and nicotine occurs in them with smaller doses of administrated substances. The experiments support the facts obtained by the author earlier on the weakening in old animals of reflexes from mechanoreceptor of vessels and on intensification of chemoreceptor sensitivity. The experiments also show that these changes are connected to a certain extent with age changes in the receptor itself. (Author)

A71-13523 # **Dark adaptation under gravitation loads in sportsmen (Temnova adaptatsiia pri gravitatsiinikh navantazhenniakh u sportsmeniv).** G. V. Popov and M. G. Martinenko (Cherkas'kii Pedagogichnii Institut, Cherkassy, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Sept.-Oct. 1970, p. 655-660. 14 refs. In Ukrainian.

Dynamics of dark adaptation of the optic analyser during a change of the body position in space was studied in sportsmen of different qualification and specialization. The time of adaptation was determined in the initial position, directly and two minutes after the passive change of the position by means of a rotatory stand. It is established that the initial value of adaptation time among highly qualified sportsmen is less than that in nonsportsmen, particularly among gymnasts, acrobats, and wrestlers. The speed and degree of adaptation restoration is connected with the degree of physical training and adaptability of a man to the change of the body position. A supposition was advanced that the disturbance in blood supply of the brain and retina, and the general reaction of an organism of the 'stress' type are possible components of a mechanism of the above-described changes under conditions of the experiment. (Author)

A71-13524 # **Effect of X rays on animals exposed to UV rays previously (Vpliv rentgenivs'kikh promeniv na tvarin, poperedn'o opromynenikh UF-promeniami).** V. I. Isaenko (Akademiia Nauk Ukrains'koi RSR, Laboratoriia Radiatsiinoi Biofiziki, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Sept.-Oct. 1970, p. 681-684. 7 refs. In Ukrainian.

Discussion of experiments in which two groups of dogs were exposed to X rays with or without previous exposures to UV radiation. The protein composition, the chemical composition and the hemoglobin content of the blood, and the thermostability of the blood serum were determined after exposures. The changes caused by X rays in these characteristics were generally lower after previous exposures to UV light. V.Z.

A71-13525 # **Determination of visual information processing rates with the aid of tables (under working conditions) (Viznachennia shvidkosti pererobki zorovoi informatsii z dopomogoiu tablits' /v umovakh virobnitstva/).** O. O. Navakatikian (Kiivskii Institut Gigieni Pratsi ta Profzakhvoriuvan', Kiev, Ukrainian SSR) and V. V. Krizhanivs'ka (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Sept.-Oct. 1970, p. 697-701. 10 refs. In Ukrainian.

Discussion of five types of tables with Landholdt fringes designed to facilitate the determination of visual information processing rates during industrial processes. Instructions are given concerning the use of these tables in such applications. The calculations involved are carried out. Examples of the application of this technique are given. V.Z.

A71-13691 # **Electrophysiology of the conducting paths of the spinal cord (Elektrofiziologiia provodiashchikh putei spinnogo mozga).** A. A. Oganisian. Moscow, Izdatel'stvo Nauka, 1970. 264 p. 510 refs. In Russian.

Recent data concerning the sensory and motor paths of the spinal cord are presented. A particular attempt is made to justify the basic principles of organization of the sensory and motor paths of the spinal cord. An effort is made to correlate electrophysiological and clinical data, and the anatomical and physiological bases of the plastic properties of the spinal cord are considered. A new picture of the conducting paths of the spinal cord is presented on the basis of applications of neuron theory. A.B.K.

A71-13692 # **Formation of a visual image (Formirovanie zritel'nogo obraza).** V. P. Zinchenko and N. Iu. Vergiles. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969. 107 p. 91 refs. In Russian.

A detailed investigation is made of the problem of image formation on the retina, hypothesizing not only a repeated change in the operative units of perception or image alphabet, but also a change in the alphabet of the motor components of perception. Methods of investigating the activity of the visual system under conditions of image stabilization, and under conditions of free viewing, are outlined. New data concerning perception under

conditions of stabilization are presented. The manipulative ability of the visual system and the problem of image invariance are considered. A study is made of vicarious actions within the context of thought problems. A functional model of the sensory element of the visual system is developed. A.B.K.

A71-13693 * **Runway performance and reward magnitude.** Edward L. Wike and Jaw-Sy Chen (Kansas, University, Lawrence, Kan.). *Psychonomic Science*, vol. 21, Nov. 10, 1970, p. 139, 140. 13 refs. Research supported by the General Research Fund and NASA.

The training, extinction, and retraining performance of three groups of rats with large rewards (11 45-mg), small (45-mg) rewards, and small (45-mg) rewards with intertrial feedings (10 45-mg) was investigated in a runway. The results were in accord with the generalization that asymptotic performance is directly related to the magnitude of reward and differed from results recently reported by McCain. (Author)

A71-13912 **A small-tipped microelectrode designed to minimize capacitive artifacts during the passage of current through the bath.** Tobias L. Schwartz and C. Randall House (Connecticut, University, Storrs, Conn.; Edinburgh, University, Edinburgh, Scotland; Marine Biological Laboratory, Woods Hole, Mass.). *Review of Scientific Instruments*, vol. 41, Apr. 1970, p. 515-517.

In the presence of an electrical current through the bathing medium, the measurement of electrical potentials in solution with glass micropipettes is characterized by an error. This error is very troublesome when glass microelectrodes are used to sense the membrane potential during voltage clamping. The source of the error is identified and discussed. The construction of a microelectrode that minimizes the error is described in detail. (Author)

A71-14086 # **Flueric carbon dioxide concentration sensor.** Fernando Villarroel and James W. Joyce, Jr. (U.S. Army, Harry Diamond Laboratories, Washington, D.C.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 29-Dec. 3, 1970, Paper 70-WA/Flcs-10.* 5 p. 5 refs. Members, $1.00; nonmembers, $2.00.

A fast-response flueric sensor that detects carbon dioxide concentrations in inhaled and exhaled breathing gases is being developed at the Harry Diamond Laboratories. This sensor, which is a miniature flueric oscillator, can measure carbon dioxide concentrations from 0 to 10 percent in air, oxygen, or any combination of the two. The system is designed so that variations in inlet gas temperature will have a minimal effect on the calibration of the sensor. Only a very small continuous flow of sampling gas is required to operate the sensor. This paper describes the flueric concentration sensor, theory and test results. (Author)

A71-14096 * # **Film boiling transition temperature for tissue cooled with liquid nitrogen.** Robert C. Hendricks (NASA, Lewis Research Center, Cleveland, Ohio). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 29-Dec. 3, 1970, Paper 70-WA/HT-16.* 6 p. 11 refs. Members, $1.00; nonmembers, $2.00.

A series of tests were undertaken to determine the film boiling transition temperature of in vitro pigskin using liquid nitrogen as the coolant. Lesions or particles can be used for controlled cooling in varying geometric patterns. Contouring and surface masking using plastics and metals can also be used to control cooling rates. In vivo experiments on fingers were in close agreement with the in vitro tests on pigskin. No deep freezing was permitted. (Author)

A71-14102 # **Evaluation of cardiac work by means of the thermodilution technique employing the thermocatheter.** S. Welland, M. Levy, R. Jacobs (Newark College of Engineering, Newark, N.J.), and R. Brancato (Saint Michael Medical Center, Newark, N.J.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 29-Dec. 3, 1970, Paper 70-WA/Temp-2.* 6 p. 7 refs. Members, $1.00; nonmembers, $2.00.

Description of a procedure developed for calculating the work performed by the left ventricle during the heartbeat. The procedure involves continuous direct measurement of fluid mixture temperature in the left ventricle during and after the controlled injection of a known volume of cold saline through a catheter into the left ventricle. The measured mixture temperatures are used to calculate instantaneous ventricular volumes during the entire heartbeat. Equations employed in the calculations were derived from an analysis of the flow processes with the application of the principles of conservation of mass and energy. The device for injecting cold saline and for continuous temperature measurement is called a thermocatheter and consists of a specially designed fast-response thermocouple and catheter assembly. The thermocouple signal is amplified by a high-gain low-noise dc amplifier. The volume-vs-time plot from the measured ventricular fluid temperatures is combined with the measured ventricular pressure trace to provide a pressure-vs-volume plot (work diagram). T.M.

A71-14110 * # **Hard tissue as a composite material. I - Bounds on the elastic behavior.** J. Lawrence Katz (Rensselaer Polytechnic Institute, Troy, N.Y.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 29-Dec. 3, 1970, Paper 70-WA/BHF-3.* 17 p. 86 refs. Members, $1.00; nonmembers, $2.00. NASA-supported research; PHS Grants No. 5 P01 DE-2336-4; No. 5 T01 DE-117-7.

Reexamination of the Voigt or parallel model of the elastic behavior of bone as a two-phase composite material, using recent data for the elastic moduli of hydroxyapatite as measured by ultrasonic methods. It is shown that the Voigt model alone cannot be used to describe the behavior of bone. Correlative data on the elastic behavior of dentin, enamel, and various bone samples indicate the existence of a nonlinear dependence of elastic moduli on the composition of hard tissue. Several composite models are used to calculate the bounds on the elastic behavior of these tissues. The limitations of these models are described, and further experiments are discussed to obtain additional critical data. T.M.

A71-14111 # **Measurement of sequential velocity development in the aorta.** J. W. Amyot, G. P. Francis, K. M. Kiser, and H. L. Falsetti (New York, State University, Buffalo, N.Y.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 29-Dec. 3, 1970, Paper 70-WA/BHF-13.* 6 p. 7 refs. Members, $1.00; nonmembers, $2.00. Research supported by the Heart Association of Southwestern New York, the Heart Association of Western New York, and the National Institute of Health Bio-Medical Fund.

A conical hot-film probe has been used to measure the instantaneous velocity distribution across the ascending aorta of six anesthetized dogs. Sequential velocity developments during systole are presented and instantaneous volumetric flows are obtained from the integrated profiles. The calculated flows are in agreement with standard measurements of cardiac output. The measurements show that maximum reverse flow occurs at the endsystole when the dicrotic notch is observed in the aortic pressure trace. Nonsymmetry was observed in the sequential velocity profiles during the early phases of ejection, followed by more nearly symmetric profiles as the flow decelerated. The conical probe used for the measurements is mounted on the end of a 1.5 mm hypodermic needle. Calibration is carried out in a tow tank using both water and heparinized whole blood. (Author)

A71-14112 • # **Analysis and physiological monitoring of the human left ventricle.** D. N. Ghista, K. Balachandran (Washington University, St. Louis, Mo.), S. H. Advani (West Virginia University, Morgantown, W. Va.), G. H. Gaonkar (Southern Illinois, University, Edwardsville, Ill.), and A. J. Brady (California, University, Los Angeles, Calif.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 29-Dec. 3, 1970, Paper 70-WA/BHF-14.* 13 p. 17 refs. Members, $1.00; nonmembers, $2.00. NIH Grant No. FR-07054; NSF Grant No. G-22296; Grant No. NGL-49-001-001.

Development of mathematical models of the human left ventricle (LV) to determine the physiological response-oriented parameters which have diagnostic significance. These parameters are the rheological parameters of the left ventricular muscle, the effective modulus of the LV, and the state of stress in the LV. Plane stress finite element analysis of a planor irregular geometry of the LV is performed, and the resulting stresses are reduced by a factor heuristically determined to make allowance for the actual 3-dimensional geometry of the LV; the stresses obtained thus bring out effects of irregular boundary of varying (and at times high) curvature. F.R.L.

A71-14113 # **Large deformation analysis of the arterial cross section.** B. R. Simon, A. S. Kobayashi, D. E. Strandness, and C. A. Wiederhielm (Washington, University, Seattle, Wash.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 29-Dec. 3, 1970, Paper 70-WA/BHF-15.* 8 p. 24 refs. Members, $1.00; nonmembers, $2.00. NIH Grant No. GM-6436-02.

Investigation of possible relationships between mechanisms contributing to atherosclerosis and arterial wall stresses and deformations. Necessary material properties are determined experimentally and from available data in the literature by assuming the arterial response to be a static finite deformation of a thick-walled cylinder constrained in a state of plane strain and composed of an incompressible, nonlinear, elastic, orthotropic material. The partial derivative of the strain energy density function necessary for in-plane stress calculation is determined to be of exponential form using in situ biaxial test results from the canine abdominal aorta. An axisymmetrical numerical integration solution is developed and used as a check for finite element results. Fung's exponential form for the strain energy density function of soft tissues is found to be valid for the aorta in the biaxial states considered. It is also shown that significant tangential stress gradients are present in arteries commonly assumed to be thin-walled tubes when using linear theory. T.M.

A71-14188 **Simultaneous contrast, filling-in process and information processing in man's visual system.** H. J. M. Gerrits and A. J. H. Vendrik (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Experimental Brain Research,* vol. 11, no. 4, 1970, p. 411-430. 55 refs.

Experimental investigation of neural activities generated along the border of a stimulus (the so-called simultaneous contrast) and the filling-in time to explain the principles of visual processing in man. A model is proposed which is based upon stabilization experiments, neuronal recordings of other authors and reports of patients with defective visual systems. The well-known first stages (retina-lateral geniculate body-area 17) and a following, yet unlocalized, stage (called 'higher center') are distinguished. Stabilization experiments suggest a spreading capacity and a long adaptation time of this higher center. The spreading of activity is inferred clinically and from observation of the filling-in phenomenon. Long adaptation time is suggested by the slow disappearance of the stabilized image. In normal vision small eye movements, continually activating on-center cells and off-center cells along the contrast border preserve continuous perception of the whole homogeneously illuminated area from transient border activities. Neuronal mechanisms and a model of antagonistic barriers and mutual neutralization are discussed and indicated in a diagram. O.H.

A71-14248 # **Determination of aircraft noise in PNdB units from the viewpoint of COMECON and ISO requirements concerning soundproofing of compartments in buildings (Określanie hałasów lotniczych w jednostkach PNdB w świetle wymagań RWPG oraz ISO dotyczących ochrony przeciwdźwiękowej pomieszczeń w budynkach).** Tadeusz Rajpert. *Technika Lotnicza i Astronautyczna,* vol. 25, Sept. 1970, p. 23-27. In Polish.

Evaluation of sound measurement standards issued by ISO and COMECON from the viewpoint of their practical utility in airport noise control. The purpose of the study is to demonstrate the divergence of separate methods and recommendations which lead to contradictory evaluations of actual and maximum permissible noise levels. The current Polish Building Standard recommendations for specifying noise levels are outlined, and factors which must be included in obtaining meaningful noise data are described. T.M.

A71-14249 **Strength of a light-dark cycle as a Zeitgeber for circadian rhythms in man (Zur Zeitgeber-Stärke eines Licht-Dunkel-Wechsels für die circadiane Periodik des Menschen).** Rütger Wever (Max-Planck-Institut für Verhaltensphysiologie, Seewiesen über Starnberg, West Germany). *Pflügers Archiv,* vol. 321, no. 2, 1970, p. 133-142. 23 refs. In German.

Circadian rhythms of 8 human subjects were studied in strong isolation, under the influence of an artificial light-dark cycle with a period of 24 hours. None of the subjects was synchronized to this Zeitgeber, but all subjects showed autonomous (free-running) rhythms. In contrast to this, 16 subjects living under the influence of a same light-dark cycle but completed by sounds of a gong at regular intervals, were all synchronized to the Zeitgeber; at each sound of the gong, the subjects were instructed to give an urine sample, and to do some tests. The highly significant difference in the results obtained under these different conditions shows that an artificial light-dark cycle is a very weak Zeitgeber; it becomes effective when completed by regular acoustic signals. The reason may be that all the subjects had perceived the signals as social contacts. From this it is concluded that, in man, 'social' Zeitgebers are more effective than 'physical' Zeitgebers. (Author)

A71-14250 **Shift of threshold temperature for shivering and heat polypnea as a mode of thermal adaptation.** Kurt Brück, Wolf Wünnenberg, Hartmut Gallmeier, and Brigitte Ziehm (Marburg, Universität, Marburg an der Lahn, West Germany). *Pflügers Archiv,* vol. 321, no. 2, 1970, p. 159-172. 20 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Study of the biological significance of the shift in the threshold temperature for shivering in guinea pigs. Newborn guinea pigs were divided into three groups and kept for several weeks at one of the following environmental conditions: (1) 1.28 C, (2) 2.3 C, and (3) 12 hr daily at 3 C and 12 hr at 28 C. At the age of four to seven weeks, threshold temperatures for shivering and heat polypnea were determined. In addition, the maximum amount of nonshivering thermogenesis was measured using the noradrenaline test. Basic differences were found in threshold behavior, depending on whether the animals were exposed constantly or intermittently to a cool environment. Z.W.

A71-14331 **Optical and acoustical pattern recognition in men (Optische und akustische Zeichenerkennung beim Menschen).** Wolf D. Keidel (Erlangen-Nürnberg, Universität, Erlangen, West Germany). *Naturwissenschaftliche Rundschau,* vol. 23, Dec. 1970, p. 491-498. In German.

Discussion of some neurophysiological aspects of optical and acoustical perception in man. The basic features of pattern recognition in man are presented and the role played by the sense of cognizance in the analytical evaluation of optically percepted images

is discussed. The recently obtained results in the study of optical neuron excitation behavior are described. The features of acoustic waves and their perception by the sense of hearing are examined. The physiological aspects of time awareness are discussed. The mechanism of esthetical perception - e.g., of music - is examined, and some new results obtained by computerized evaluation of physiological experimental data are presented. Z.W.

A71-14332 Past and future of alga study (Vergangenheit und Zukunft der Algenforschung). Ernst G. Pringsheim (Göttingen, Universität, Göttingen, West Germany). *Naturwissenschaftliche Rundschau,* vol. 23, Dec. 1970, p. 502-504. In German.

Summary of 60 years of experience in the study of alga physiology. The features of algae cultures and the production of pure species are described. The errors committed and achievements obtained during alga research in the past are briefly reviewed. Recommendations for future studies are included. Z.W.

A71-14372 # Experimental and theoretical investigations concerning a 'frequency filter behavior' of the human retina regarding electric pulse currents (Experimentelle und theoretische Untersuchungen über ein Frequenzfilterverhalten der menschlichen Retina gegenüber elektrischen Impulsströmen). Alfred Meier-Koll. München, Technische Hochschule, Fakultät für Maschinenwesen und Elektrotechnik, Dr.-Ing. Dissertation, 1970. 90 p. 29 refs. In German.

Discussion of investigations involving patients with injuries in the visual nervous system, which lead to an identification of the epithelial ganglion of the retina as a frequency filter taking also into consideration a model of the retinal ganglion which can account for the observed behavior. Threshold curves of the injured visual organs are compared with threshold curves obtained with a control group as a basis for the identification. A model which considers the epithelial ganglion as a homogeneous cell layer in which adjacent neurons interact is discussed. It is shown how the behavior of the cells against alternating exciting currents can be explained. G.R.

A71-14376 Sensitization by annular surrounds - Individual differences. Davida Y. Teller and Bryant Lindsey (Washington, University, Seattle, Wash.). *Vision Research,* vol. 10, Oct. 1970, p. 1045-1055. 22 refs. PHS Grant No. NB-08070 (now No. EY-00421).

Results of replications on ten subjects of Westheimer's (1965) experiment, in which he showed that the scotopic increment threshold for a small test spot located at the center of an illuminated disk varied with the diameter of the disk. He found that, on his own eye, the threshold passed through a maximum for disks of approximately 45 min diameter (the 'peak diameter'). In the studies described it was found that the peak diameter varies consistently from one subject to the next and, within some subjects, shifts from smaller to larger diameters with decreasing retinal illuminance. F.R.L.

A71-14377 Contour effects on a brightness paradox. Sten Sture Bergström and Berit Rubenson (Uppsala, Universitet, Uppsala, Sweden). *Vision Research,* vol. 10, Oct. 1970, p. 1057-1064. 16 refs. Research supported by the Statens råd för Samhällsforskning.

Investigation of a contrast phenomenon in the form of a brightness paradox in the perception of certain luminance gradients in space. The influence on the paradox of demarcating the inducing from the induced fields by dark contours was measured, using a 'constant sum' estimation method. The result was a decrease in brightness paradox when contours were introduced between inducing and induced fields. The relations between these results and earlier findings are discussed, as well as the relevance of these data for Békésy's modified neural unit. F.R.L.

A71-14378 A model of accommodation. F. M. Toates (Sussex, University, Brighton, England). *Vision Research,* vol. 10, Oct. 1970, p. 1069-1076. 28 refs.

Extension of a previous accommodation model (Toates, 1969) in such a way as to conform at all stages to the ophthalmologist's understanding of accommodation. The nervous control of the ciliary muscle is central to the present model. Thus it enables the ophthalmologist to have a much clearer understanding of the working of the system. F.R.L.

A71-14392 # Influence of prolonged space flight on the human organism - Certain results of medicobiological research associated with the flight of the Soyuz 9 spacecraft (Vliianie dlitel'nogo kosmicheskogo poleta na chelovecheskii organizm - Nekotorye rezul'taty mediko-biologicheskikh issledovanii v sviazi s poletom kosmicheskogo korablia 'Soiuz-9'). O. G. Gazenko and B. S. Aliakrinskii. *Akademiia Nauk SSSR, Vestnik,* vol. 40, Nov. 1970, p. 40-46. In Russian.

Survey of the biomedical aspects of the manned orbital flight of Soyuz 9, including descriptions of preliminary conditioning, the life-support environment, the medical experiment program, and preliminary results. Feeding, sleeping, and respiration regimens are outlined, and changes observed by means of inflight biotelemetry and in post-flight examinations are evaluated. Much attention is devoted to the effects of weightlessness on various body functions. T.M.

A71-14422 The directivities of some ultrasonic Doppler probes. P. N. T. Wells (Bristol, University; United Bristol Hospitals, Bristol, England). *Medical and Biological Engineering,* vol. 8, May 1970, p. 241-256. 28 refs. Research supported by the Medical Research Council and the Department of Health and Social Security.

The applications of ultrasonic Doppler techniques in medical diagnosis are reviewed. The directivities of ultrasonic probes may be measured by observation of the echo amplitudes from various target configurations, and with long ultrasonic pulses. Instrumentation operating at a frequency of 2 MHz is described. Measurements of the directivities of several transducer arrangements for both spherical and flat targets are presented, and some of the results are compared with theoretical predictions. The directivity of the probe depends upon its construction. In general, with separate transmitting and receiving transducers, there is a region of maximum central axial sensitivity (in water) which is closer to the array than the cross-over point of the beams. It is pointed out that absorption in biological materials modifies the effective distribution in clinical practice. Off-axis measurements, and the effects of target angulation, are presented in selected cases. Methods based on schlieren observations and the use of moving targets for beam plotting are also discussed. (Author)

A71-14423 * EMG-force dynamics in human skeletal muscle. J. C. Coggshall (California, University, San Diego, Calif.) and G. A. Bekey (Southern California, University, Los Angeles, Calif.). *Medical and Biological Engineering,* vol. 8, May 1970, p. 265-270. 8 refs. Grant No. NGR-05-018-022.

An on-line parameter tracking algorithm, implemented on an analog computer, is used to obtain parameter values in an assumed mathematical relation between the full-wave rectified EMG and the force produced by the human triceps muscle in an isometric task. The relation between the actual force produced by human subjects and the computed force predicted by the model is discussed. (Author)

A71-14722 * Lasers in biology and medicine. Samuel Fine and Edmund Klein (Northeastern University; Massachusetts General Hospital, Boston, Mass.; Roswell Park Memorial Institute, Buffalo,

N.Y.). In: Developments in laser technology; Society of Photo-optical Instrumentation Engineers, Seminar-in-Depth, Rochester, N.Y., November 17, 18, 1969, Proceedings. (A71-14707 04-16) Seminar co-sponsored by the University of Rochester. Redondo Beach, Calif., Society of Photo-optical Instrumentation Engineers (SPIE Seminar Proceedings. Volume 20), 1969, p. 129-140. 91 refs. Contracts No. DA-49-193-MD-2436; No. DA-49-193-MD-2437; Grant No. NGR-22-011-007.

Lasers are being applied to an increasing extent in biology and medicine. Studies have been carried out at various wavelengths, from the ultraviolet to the infrared, at energy levels from the milli-joule region to more than 100 joules per pulse and at power levels from the milliwatt to the multimegawatt region. Biological studies have been carried out at the molecular level, on cellular components and isolated cells, on microorganisms, viruses, and tissue culture, on isolated physiologic systems, individual organs, and on intact animals. Studies in man have been oriented toward the use of the laser in ophthalmology, exploration of its potential as a surgical tool and for tumor eradication. The coherence property is being used in exploratory studies directed toward radiology and diagnosis with ultrasonic holography. Hazards associated with laser radiation are being determined and methods and procedures for minimizing these hazards developed. In this survey attention will be directed toward representative studies to provide the reader with some appreciation of the use of lasers in biology and medicine. (Author)

A71-14740 **Vigilance performance under hypoxia.** Richard L. Cahoon (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Psychology*, vol. 54, Dec. 1970, p. 479-483. 11 refs.

Vigilance performance by 20 young male subjects on a 2-hr brightness discrimination task was tested under four levels of hypoxia: 21% oxygen (sea level), 12.8% oxygen (13,000 ft), 11.8% oxygen (15,000 ft), and 10.9% oxygen (17,000 ft). The results indicated a significant decrement in signal detection as a function of severity of hypoxia and task duration. Analyses of d prime and beta showed a significant decrease in detectability of the signal as a function of hypoxia, but no change in caution of decision making. In addition, individual variation in performance was related to field dependence as measured by the Embedded Figure Test (EFT). EFT score correlated negatively with false detection rate, and positively with reaction time and d prime, indicating a negative relationship between field dependence and vigilance performance. (Author)

A71-14741 **Vigilance performance in a bimodal task.** Arthur V. Hohmuth (Delaware, University, Newark, Del.). *Journal of Applied Psychology*, vol. 54, Dec. 1970, p. 520-525. 15 refs.

An effort was made to evaluate the need for an arousal construct in a theory of vigilance, as opposed to a theory based on a selective attention construct. Performance over time was examined in a situation involving two detection tasks, one in each of two modalities. The Ss were instructed to direct their attention to one of the two tasks, the primary task; the other task was of secondary importance. The main concern was in discovering whether the vigilance decrement would be specific to the primary task, as would be suggested by the selective attention theory, or whether it would be seen in both tasks, as suggested by the arousal construct. The data show that the decrement is task specific. However, it is not always the primary task which shows the decrement. It is argued that neither the construct of arousal nor that of selective attention is adequate, alone, to deal with the vigilance decrement. The results are discussed in terms of these two concepts and in terms of some practical implications for the design of real-life displays. (Author)

A71-14751 **Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings.** Edited by Jan Stahle (University Hospital, Uppsala, Sweden). Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970. 302 p. $18.75.

Contents:

A71-14752 ***Experiments in vestibular physiology.*** G. F. Dohlman (Defence Research Establishment; Toronto, University, Toronto, Canada). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 1-7.

Account of some experiments conducted with the intent to elucidate the mechanism which provides and maintains the chemical composition of the endolymph and the structure and function of the cupola as the prerequisites for the physiological function of the hair cells. The results of these experiments have proved the secretional function of the planum semilunatum cells and the presence of the polysaccharides in the endolymph, together with certain possible mechanical implications. The experimental establishment of the sodium absorbing function of the 'dark cells' is of interest when

taking into account the location of these cells as a shield surrounding the hair-cell areas which are known to be sensitive to changes in the normal potassium and sodium concentration important for their physiological function. F.R.L.

A71-14753 • Vestibular problems in prolonged manned space flight. Ashton Graybiel (U.S. Naval Aerospace Center, Aerospace Medical Institute, Pensacola, Fla.). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 9-25. 40 refs. NASA-sponsored research.

Consideration of the biomedical factors involved in prolonged manned space flight, taking account of specific problems involving the vestibular organs both in weightlessness and in a rotating environment. Artificial gravity as provided by a rotating room has many advantages, such as aiding life support activities, providing efficiency at many tasks, maintaining physiological fitness aloft, and providing fitness at reentry. The disadvantages have their origin in the Coriolis accelerations generated by the motions of the astronaut or space traveler. These disadvantages are ataxia and Slow Rotation Room (SRR) sickness. SRR sickness may be either acute or chronic. F.R.L.

A71-14754 Vision during angular acceleration considered in relation to aerospace operations. Fred E. Guedry, Jr. (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 27-34. 10 refs. Army-Navy-sponsored research.

Extension of the observations of Hixson and Niven (1964), who noted that visual acuity was very different during equal magnitude angular accelerations, depending upon whether the stimulus was of a direction to produce upbeating or downbeating nystagmus. Specifically, the extended work deals with relationships between vestibular stimuli, vestibular nystagmus, and degradation of visual acuity when the vestibular stimuli jnterfere with voluntary efforts to see specific visual detail. F.R.L.

A71-14755 Electrophysiological experiments on the isolated surviving labyrinth of elasmobranch fish to analyse the responses to linear accelerations. O. E. Lowenstein (Birmingham, University, Birmingham, England). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 35-41. 14 refs.

Contribution to the search for the site of origin of responses to linear acceleration, especially of those that have been postulated to modify the basic response picture of the semicircular canals. Electrophysiological experiments were conducted by means of a specially designed dual-purpose accelerator, which is described. F.R.L.

A71-14756 • Some recent studies on the perception of rotation. Brant Clark (San Jose State College, San Jose, Calif.). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 43-54. 20 refs. Research supported by the National Research Council; Grant No. NGR-05-046-002.

Summary of several studies conducted at Ames Research Center which are concerned with the perception of rotation in normal men. The Ames Man-Carrying Rotation Device (MCRD) was used to obtain the data. It is a one-degree-of-freedom simulator which rotates about a vertical axis up to 45 rpm, and is capable of continuous variations of angular acceleration to a maximum of 30 deg/sec/sec. The data show that the perception of rotation is dependent upon the interaction of complex transducer mechanisms in the receptors, as well as highly complex central nervous system processes. The data on thresholds suggest that normal men are even more sensitive to angular acceleration under optimum testing conditions than earlier studies had shown. F.R.L.

A71-14757 The caloric test in parabolic flight and during a turn in the horizontal plane. W. J. Oosterveld. In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 55-63. 9 refs.

Investigation of the quantitative effect of gravity on caloric nystagmus, as well as the effect of gravity on rotational nystagmus. The investigations were carried out in a two-engined aircraft (Fokker Friendship). Caloric tests were performed on humans, and rotary tests were performed on rabbits. Weightlessness was achieved by making a parabolic flight. Horizontal turns, each lasting 30 sec, producing a resultant force of 2.5 g. It was found that caloric and rotational nystagmus both depend on the function of the semicircular canals. F.R.L.

A71-14758 Influence of the force of gravity on the experimental nystagmus. A. Montandon, S. Huguenin, and M. Luyet. In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 65-73. 14 refs. Research supported by the Swiss National Research Foundation.

Results of production of experimental nystagmus by electrical stimulation of the nystagmogenic area of Lachmann, situated in the mesodiencephalon, in rabbits, using the procedure of Monnier. In this way it is possible to combine different types of vestibular stimulations, caloric or rotatory, with the central diencephalic electric one, and to study the effects of each on the nystagmus. It is also possible to combine this central stereotaxic stimulation with the modifications of the force of gravity respective of various positions of the head in space. The nystagmus is recorded by conventional electronystagmography. With this approach, an attempt was made to specify and to quantify the effects of gravity on experimental nystagmus, as well as on the reactions of the semicircular canals with regard to vestibular disorders in space flight. The functional correlation with the otolith organs is also discussed. F.R.L.

A71-14759 Findings, tasks and importance of extraterrestrial vestibular research. Herbert J. Pichler. In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 75-85. 55 refs.

Discussion of the findings of the Austrian Space Circle in the field of extraterrestrial vestibular research. A theoretical conclusion

is developed which indicates that on leaving the earth's field of gravity, a change in the regulation of the otolithic apparatus takes place, i.e., from geocentric to heliocentric orientation. F.R.L.

A71-14760 Form and organization of the vestibular sensory cells. H. Engström, H. Lindeman (University Hospital, Uppsala, Sweden), and B. Engström. In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 87-96. 8 refs.

Review of work by various authors who have carefully described the epithelial cells of the vestibular sensory regions. Basic information on the principles of the morphological polarization is given, and some electron micrographs are presented which demonstrate main features of the sensory cells and their neural contacts. From studies by Lindeman it has become evident that systematic localized degenerations can appear in the vestibular regions after administration of certain ototoxic drugs. F.R.L.

A71-14761 • Evaluation of otolith organ function by means of ocular counter-rolling measurements. Earl F. Miller, II (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 97-107. 14 refs. NASA-sponsored research.

Demonstration that, when certain critical requirements are met, ocular counterrolling is a valid indicator of otolith function. The photographic method affords high precision of measuration which extends its usefulness to testing individuals with severe macular destruction as well as normals subjected to conditions which act to reduce otolith function, including near weightlessness as experienced in aerospace flight. Loss of otolith function cannot always be predicted from the results of tests of hearing or the semicircular canals. The magnitude of the counterrolling response (Counterrolling Index) provides a measure of the general functional level of the otolith apparatus, although the limits of normal function need to be better defined. F.R.L.

A71-14762 Counter-rolling of the eyes in some unilateral vestibular disorders. J. Terins. In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 109-113. 5 refs.

Discussion of the results of several investigations on counterrolling of the eyes in patients with different unilateral lesions and diseases of the labyrinth. Observed effects of a clinically total destruction of one labyrinth, Ménière's disease, labyrinthectomy, and vestibular neutritis on counterrolling are shown graphically and discussed. It is concluded that it does not seem possible to determine on which side the otolith organs are damaged from a counterrolling curve. O.H.

A71-14763 Studies on the ascending vestibulo-ocular reflex arc. Gunnar Aschan (Regional and University Hospital, Linköping, Sweden). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 231-249. 43 refs. Research supported by the Swedish Medical Research Council.

Study of the vestibular nystagmus, eye deviation, and head movements after simulation followed by destruction within the medial longitudinal fasciculus (MLF) at the level of the vestibular nuclei. The course and the function of the ascending neuron - i.e., one of the constituents of the vestibulo-ocular reflex arc - is examined, with particular attention to MLF which is believed to carry the ascending neuron. Stimulation and electrolytic lesion experiments carried out in rabbits are described, and the physiological findings obtained are correlated with neuro-anatomy. The resulting observations are summarized. It has been found that, from a neuro-anatomical point of view, the discrete lesions produced within a rather restricted area of the MLF show retrograde cellular changes which might indicate a somatotopical functional organization within the MLF. The results of the vestibular functional tests correlated to the neuro-anatomy also favor this view. O.H.

A71-14764 Retention of vestibular habituation. C. R. Pfaltz and P. Piffko (Bürgerspital, Basel, Switzerland). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 251-265. 16 refs.

Study of the correlation between retention of a vestibular response decline and stimulus intensity, and the correlation between retention and binaural application of the vestibular stimulus. Habituation is shown to indicate the phenomenon of progressive reduction of the nystagmic response (response decline) to either repetitive rotatory or caloric tests; it is characterized by acquisition, retention, and transfer. To investigate the above correlations, experiments were carried out in 15 young healthy persons by exposing them to rotatory and caloric stimulation tests. The resulting data are presented graphically, discussed in detail, and summarized. O.H.

A71-14765 Vestibular nerve projection to association fields of the cerebral cortex in the monkey. J. M. Fredrickson (Stanford University, Palo Alto, Calif.). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 289-299. 26 refs. NIH Grant No. 5 RO1 NB-07087.

Experimental study carried out to determine the association fields of cortical projection for the vestibular nerve under alpha chloralose and to determine this projection without an anesthetic agent as well. Healthy Rhesus monkeys were used in this experiment. The results are discussed in detail and summarized. O.H.

A71-14766 Transganglionic degeneration in the vestibular nerve. G. Grant, L. Ekvall, and J. Westman (Uppsala, Universitet, Uppsala, Sweden). In: Vestibular function on earth and in space; Bárány Society, Vestibular Symposium, Uppsala, Sweden, May 29-31, 1968, Proceedings. (A71-14751 04-04) Edited by Jan Stahle. Oxford, Pergamon Press, Ltd. (Wenner-Gren Center International Symposium Series. Volume 15), 1970, p. 301-305. 18 refs. Research supported by the Svenska Livförsäkringsbolags Nämnd för Medicinsk Forskning.

Experimental investigation of the problem of whether transection of a peripheral sensory nerve branch would result in degeneration of the central branch. The vestibular nerve in rabbits was chosen for this experiment. As a result, electron dense degenerating boutons were found in the ventral part of the lateral vestibular nucleus in contact with both cell bodies and dendrites of the nerve cells. It is

suggested that the degeneration has apparently been transganglionic and caused by transection of a peripheral nerve branch of a bipolar neurone. O.H.

A71-14776 * Growth inhibition in Thiobacillus neapolitanus by histidine, methionine, phenylalanine, and threonine. Corinne L. Johnson and Wolf Vishniac (Rochester, University, Rochester, N.Y.). *Journal of Bacteriology*, vol. 104, Dec. 1970, p. 1145-1150. 14 refs. NSF Grants No. GB-2758; No. GB-8217; Grant No. NsG-209-62.

Discussion of growth inhibition of Thiobacillus neapolitanus by four amino acids in a strict autotroph, and of relationships with other amino acids in the release of inhibition. Inhibition of growth by these amino acids is observed only under conditions of amino acid imbalance. The evidence suggests that these amino acid inhibitions may be related to those in heterotrophs, and also poses the question whether other amino acid inhibitions in autotrophs could be due to similar causes, or require other explanations. M.M.

A71-14785 Dynamic response of biomechanical systems; American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., November 29-December 3, 1970, Proceedings. Edited by Nicholas Perrone (U.S. Navy, Office of Naval Research; Catholic University of America, Washington, D.C.). New York, American Society of Mechanical Engineers, 1970. 154 p. Members, $12; nonmembers, $15.

Contents:

Foreword. N. Perrone (U.S. Navy, Office of Naval Research; Catholic University of America, Washington, D.C.), p. iii.

Crashworthiness and biomechanics of vehicle impact. N. Perrone (U.S. Navy, Office of Naval Research; Catholic University of America, Washington, D.C.), p. 1-22.

Computer simulation of body kinematics associated with rapid decelerations. D. J. Segal (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.), p. 23-45. 11 refs. (See A71-14786 04-05)

Mechanics and pathomorphology of impact-related closed brain injuries. F. J. Unterharnscheidt (Texas, University, Galveston, Tex.) and E. A. Ripperger (Texas, University, Austin, Tex.), p. 46-83. 131 refs. (See A71-14787 04-04)

Forces and moments sustained by the lower vertebral column of a seated human during seat-to-head acceleration. A. P. Vulcan (Department of Supply, Melbourne, Australia) and A. I. King (Wayne State University, Detroit, Mich.), p. 84-100. 18 refs. (See A71-14788 04-05)

Experimental model studies of some dynamic response characteristics of the semicircular canals. M. Anliker and W. C. Van Buskirk (Stanford University, Stanford, Calif.), p. 101-132. 11 refs. (See A71-14789 04-05)

Dynamic control models of the semicircular canals. L. R. Young (MIT, Cambridge, Mass.), p. 133-145. 17 refs. (See A71-14790 04-05)

Dependence on position of the dynamic characteristics of a human operator subjected to vibration. K. V. Frolov (Gosudarstvennyi Nauchno-Issledovatel'skii Institut Mashinovedeniia, Moscow, USSR), p. 146-150. 12 refs. (See A71-14791 04-05)

A71-14786 Computer simulation of body kinematics associated with rapid decelerations. David J. Segal (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.). In: Dynamic response of biomechanical systems; American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., November 29-December 3, 1970, Proceedings. (A71-14785 04-05) Edited by Nicholas Perrone. New York, American Society of Mechanical Engineers, 1970, p. 23-45. 11 refs.

A brief review of Cornell Aeronautical Laboratory's history in simulating human body kinematics via mathematical model for automotive safety research is given. The basis for much of the simulation work has been a ten-degree-of-freedom articulation of eight rigid body links used to represent the planar motions of the human body. A number of models are described and examples of their applications presented. Among the applications noted are: a study of 'submarining' tendencies of lap- and lap-and-torso-belted vehicle occupants; use of a model for both automotive and airline seat design information; a study of contact locations and energy absorption requirements of automobile interiors; and a study of pedestrian impacts with a vehicle exterior. Recent modifications and extensions, notably, the addition of a four-degree-of-freedom energy-absorbing steering column and an air bag model, are described. Future plans for the study of biomechanics of vehicle impact through the use of computer simulations are discussed. (Author)

A71-14787 Mechanics and pathomorphology of impact-related closed brain injuries. Friedrich J. Unterharnscheidt (Texas, University, Galveston, Tex.) and Eugene A. Ripperger (Texas, University, Austin, Tex.). In: Dynamic response of biomechanical systems; American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., November 29-December 3, 1970, Proceedings. (A71-14785 04-05) Edited by Nicholas Perrone. New York, American Society of Mechanical Engineers, 1970, p. 46-83. 131 refs. Research supported by the Medical Research Foundation of Texas; NIH Grant No. NB 07377-03.

Discussion of injury-producing mechanisms in brain injuries in which the dura mater is left intact and of the types of injuries which can be produced in such cases. Morphological alterations produced by blows to the head are divided into primary and secondary lesions. Injuries occur in the form of cortical contusions which are primary traumatic lesions of the brain tissue, in which the various elements such as neurons and glial cells suffer irreversible damage. Injuries occur also as central traumatic brain lesions. Other types of injury considered are brainstem lesions and various types of hemorrhages. The connection between the mechanical aspects of the brain injury and the morphological alterations observed are discussed in detail. G.R.

A71-14788 Forces and moments sustained by the lower vertebral column of a seated human during seat-to-head acceleration. A. P. Vulcan (Department of Supply, Aeronautical Research Laboratories, Melbourne, Australia) and Albert I. King (Wayne State University, Detroit, Mich.). In: Dynamic response of biomechanical systems; American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., November 29-December 3, 1970, Proceedings. (A71-14785 04-05) Edited by Nicholas Perrone. New York, American Society of Mechanical Engineers, 1970, p. 84-100. 18 refs. NIH Grant No. FR-07051-04.

The recently reported study on the significance of bending strains in vertebral bodies during caudocephalad acceleration is extended to measure and model forces and moments in the vertebral column. Output from strain gages mounted on the anterior and lateral aspects of several vertebral bodies were converted to axial force and bending moment. The dynamic response of the lower vertebral column is simulated by a four-degree-of-freedom model which allows independent forward rotation of both head and torso and considers the effect of the restraint systems. The model is validated by showing that it closely predicts the observed response. (Author)

A71-14789 * Experimental model studies of some dynamic response characteristics of the semicircular canals. Max Anliker and William C. Van Buskirk (Stanford University, Stanford, Calif.). In: Dynamic response of biomechanical systems; American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., November 29-December 3, 1970, Proceedings. (A71-14785 04-05) Edited by Nicholas Perrone. New York, American Society of

Mechanical Engineers, 1970, p. 101-132. 11 refs. Grant No. NGL-05-020-223; Contract No. N 00014-67-A-0112-0007.

Discussion of the dynamic response characteristics of the semicircular canal ducts on the basis of tests with a laboratory model whose features closely approximate the assumptions of a theoretical study. The membranous canal and the endolymph were simulated by a bicycle inner tube filled with water, glycerin-water mixtures, or pure glycerin. This tube was suspended with highly flexible rubber bands in a near-rigid toroidal duct representing the bony canal. Generally the fluid chosen to simulate the endolymph was also used as perilymph. As in the mathematical analysis the ampulla, cupula, and utricle were not included in the laboratory model. G.R.

A71-14790 * Dynamic control models of the semicircular canals. Laurence R. Young (MIT, Cambridge, Mass.). In: Dynamic response of biomechanical systems; American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., November 29-December 3, 1970, Proceedings. (A71-14785 04-05) Edited by Nicholas Perrone. New York, American Society of Mechanical Engineers, 1970, p. 133-145. 17 refs. Grants No. NGR-22-009-156; No. NGL-22-009-025.

Discussion of mathematical models for the functioning of the vestibular system including some work conducted in the area of galvanic stimulation and directional preponderance. In the overall framework of the investigation the vestibular responses form parts of the postural feedback loops, the vehicle orientation feedback loop for the pilot situation, and the visual feedback loop via the mechanism of vestibular nystagmus. Special areas where the control systems analysis has raised important questions directed to the physiologist are pointed out. G.R.

A71-14791 Dependence on position of the dynamic characteristics of a human operator subjected to vibration. K. V. Frolov (Gosudarstvennyi Nauchno-Issledovatel'skii Institut Mashinovedeniia, Moscow, USSR). In: Dynamic response of biomechanical systems; American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., November 29-December 3, 1970, Proceedings. (A71-14785 04-05) Edited by Nicholas Perrone. New York, American Society of Mechanical Engineers, 1970, p. 146-150. 12 refs.

Discussion of the effect of body position on the dynamic characteristics of a human body under random vibration taking into consideration the experimental amplitude-frequency characteristics of the 'pelvis-head' system. It is found that the dynamic characteristics of a human operator depend greatly on the position of the operator. His position influences both the number of resonances and the values of the natural frequencies at which the resonances occur. It is shown that a body in sitting position can be represented as a low-pass vibration filter. G.R.

A71-14822 * Particle track identification - Application of a new technique to Apollo helmets. R. L. Fleischer, H. R. Hart, Jr., and W. R. Giard (GE Research and Development Center, Schenectady, N.Y.). *Science*, vol. 170, Dec. 11, 1970, p. 1189-1191. 11 refs. Contract No. NAS 9-9828.

The Apollo helmets are being used to record the dose of heavy particles to which astronauts are exposed on space missions. An improved method for examining and identifying the etched tracks of heavy charged particles consists of replicating tracks and measuring the etching rate as a function of position along the track. Tracks have been observed in Apollo helmets that correspond to ionized atoms heavier than iron. (Author)

A71-14933 * # Aim of medical experiments program - To better know earth-man in space. Sherman P. Vinograd (NASA, Washington, D.C.). *Aerospace Management*, vol. 5, no. 1, 1970, p. 63-72.

Outline of a medical experiments program initiated in 1963 to study the long-term biomedical and behavioral characteristics of man in order to achieve an enhanced physiological fitness of man in space by providing expedient means. The program is described as one consisting of two groups of objectives summarized as the management and the R and D support of experiments. The functional elements of the program are defined as physiology, behavior, biochemistry, microbiology and data management. The chronology of experiments with the Integrated Medical and Behavioral Laboratory Measurement Systems (IMBLMS) and related problems are reviewed. V.Z.

A71-15051 Commercial airline pilot and his ability to remain alert. Robert E. Yoss, Norma J. Moyer, Earl T. Carter, and William E. Evans (Mayo Clinic, Rochester, Minn.). *Aerospace Medicine*, vol. 41, Dec. 1970, p. 1339-1346. 8 refs. NIH Grant No. EY-439.

Fifty commercial airline pilots were studied, by means of infrared pupillography, as to the ability of each to remain alert while sitting in darkness for 15 minutes. The pupils of those who remained alert were large and stable; if drowsiness developed the pupils became smaller and pupillary waves appeared, with ptosis or eyelid closures. The performance of each subject was placed in one of four categories: superior, average, marginal, or unsatisfactory. Of the 32 pilots who were regarded as well rested, 28 performed in either a superior or an average manner; the performance of 3 was marginal; and 1 gave an unsatisfactory performance. Pilots with inadequate rest did less satisfactorily in their tests, as a group. It is recommended that testing of this type be studied further, since the ability to remain alert at present is not included in the assessment of pilots for medical certification by the Federal Aviation Administration. (Author)

A71-15052 * Lower body negative pressure as an assay technique for orthostatic tolerance. III - A comparison of the individual response to incremental leg negative pressure vs incremental lower body negative pressure. Roger A. Wolthuis (NASA, Manned Spacecraft Center, Cardiovascular Laboratory, Houston, Tex.; Technology, Inc., Dayton, Ohio), G. W. Hoffler, and Robert L. Johnson (NASA, Manned Spacecraft Center, Biomedical Laboratories Div., Houston, Tex.). *Aerospace Medicine*, vol. 41, Dec. 1970, p. 1354-1357. 14 refs. Contract No. NAS 9-7675.

Four trained subjects each participated in several paired LBNP and Leg Negative Pressure (LNP) experiments. Negative pressure was applied in three five-minute incremental steps; pressure levels for LNP were -10 mm. Hg greater than the corresponding levels used for a given individual during LBNP. Individual calf volume changes during LNP were greater than those measured during LBNP. On the other hand, individual heart rate and stroke volume changes during LBNP always exceeded those obtained during LNP. These findings suggest that the abdominal-pelvic region plays an important role in the response elicited by LBNP. (Author)

A71-15053 Effect of metal ions on oxygen toxicity. M. W. Radomski (Defence Research Establishment, Toronto, Canada) and J. D. Wood (Saskatchewan, University, Saskatoon, Saskatchewan, Canada). *Aerospace Medicine*, vol. 41, Dec. 1970, p. 1382-1387. 30 refs.

The effect of the parenteral administration of various metal ions on the susceptibility of rats to the toxic effects of oxygen at high pressures (OHP, 75 psig) has been studied. The incidence of seizures and degree of lung damage in the treated animals were monitored. Cobalt, potassium, and calcium were without effect on oxygen toxicity in the rat. Magnesium (0.5-2.0 mmoles/kg) strongly protected rats against OHP-seizures with zinc and manganese showing marginal protection. The anticonvulsant effect of magnesium was

eliminated by simultaneous injection of calcium. The development of lung edema in the exposed animals was prevented by certain doses of manganese and zinc while magnesium had no effect on this syndrome. Although no cation tested was equally effective against both syndromes of oxygen toxicity, a mixed ion treatment of magnesium and manganese alleviated both convulsions and lung damage. (Author)

A71-15054 Synergistic oxygen-inert gas interactions in laboratory rats in a hyperbaric environment. Robert E. Thompson, Thomas W. Nielsen, and Thomas K. Akers (North Dakota, University, Grand Forks, N. Dak.). *Aerospace Medicine,* vol. 41, Dec. 1970, p. 1388-1392. 8 refs.

Results of an experiment in which male Sprague-Dawley rats were exposed to 13 or 26 ata N2 or He in 10, 8, 5, 3, and 2 ata O2 (series I), or 26 ata inert gas with 0, 25, 50, 75, and 100% in N2 in 3 ata O2 and with He as a diluent (series II). Rat tolerance was measured by observing each group's LD sub 100, and lung damage was measured by drying the rat lungs to obtain total water values. The present series I experiments have demonstrated conclusively that an O2 inert gas synergism occurs in rats in a hyperbaric environment, and that in rats this synergistic effect is caused by O2-N2 and also by O2-He. The synergistic effect of He is unexpected in view of its narcotic potency. Lung damage in the 13 ata N2 and He exposed animals increased at the higher O2 pressures, but the lung damage of the 26 ata N2 and He exposed animals was not different from O2 control values at the higher O2 pressures. Series II results indicate a gas density dependence on rat survival in 26 ata N2-He mixtures in 3 ata O2; as the N2 concentration was increased, rat survival time decreased linearly. At the increased N2 concentration, lung damage increased progressively. (Author)

A71-15055 Dynamics analysis for time of useful function (TUF) predictions in toxic combustive environments. P. Bartek, J. G. Gaume, and H. J. Rostami (Douglas Aircraft Co., Long Beach, Calif.). *Aerospace Medicine,* vol. 41, Dec. 1970, p. 1392-1395.

The 'margin' of safety for escape from a hostile environment containing toxic combustion products is contingent on many variables. These variables may be grouped into two categories: (1) physical factors and (2) physiological factors. The physical factors are the result of the dynamic changes taking place in the external environmental combustive processes. The physiological factors represent the complex physiological changes occurring in response to the toxic environment. The ability to escape is dependent on the magnitude of the consolidated biokinetic forces for environmental deterrence over a given period of time. This period of time has been referred to previously by the authors as The Time of Useful Function (TUF). Examples are considered in this approach in which the TUF is based on data of some toxic pyrolysis products generated by combustion processes. This study attempts to provide a method for determining some common factors essential for TUF predictions. (Author)

A71-15056 Electrochemical aircrew oxygen systems. R. J. Kiraly, A. D. Babinsky, and R. A. Wynveen (TRW, Inc., Cleveland, Ohio). *Aerospace Medicine,* vol. 41, Dec. 1970, p. 1400-1403.

The liquid oxygen (LOX) system for supplying breathing oxygen to aircrews was standardized into the military service in the 1950's. The LOX system was smaller and lighter than the then used gas bottles and provided sufficient breathing oxygen for extended flights. With these advantages, however, came several disadvantages. The major operational drawback is that oxygen servicing is required before each flight. Additional problems include the actual on-site generation and transportation of the LOX. As part of the desire to lower operational costs and minimize ground support requirements, new methods of providing aircrew oxygen are being sought. This paper covers the various electrochemical techniques under consideration. Of various electrochemical schemes capable of providing breathing oxygen, the two that appear most promising, and thus receiving significant attention are (1) the electrolysis of water and (2) the separation and concentration of oxygen from air. The oxygen-producing mechanics and block diagrams of both systems are presented and comparisons are made. A design of an electrochemical oxygen system package is presented. (Author)

A71-15057 Effect of time zone changes on the sleep patterns of BOAC B. 707 crews on world-wide schedules. F. S. Preston and S. C. Bateman (Air Corporations Joint Medical Service, London, England). *Aerospace Medicine,* vol. 41, Dec. 1970, p. 1409-1415. 15 refs.

The paper discusses a study of sleep patterns carried out on pilots of the Boeing 707 fleet of British Overseas Airways Corporation on worldwide schedules. Rapid transit of multiple time zones produces disruption of normal sleep patterns which, in itself, is probably one of the greatest problems facing airline pilots. The nature of sleep is examined and the practical problems surrounding the use of hypnotics are noted. (Author)

A71-15058 Unique clinical case, both of hypoxia and hypothermia, studied in a 18-year-old aerial stowaway on a flight from Havana to Madrid. J. Pajares and F. Merayo (Gran Hospital, Madrid, Spain). *Aerospace Medicine,* vol. 41, Dec. 1970, p. 1416-1420. 5 refs.

This report is concerned with the biological and clinical effects of a nine hour flight by a 18-year-old aerial stowaway. The boy travelled in the confined space of a DC-8 landing gear cell, without pressurization. He was in a state of unconsciousness, deafness and hypothermia, and had a mild respiratory tract infection. He showed leucocytosis with neutrophilia, hyperpotassemia, hyponatremia, acidosis, elevation of the transaminases and bilirubin. There was glucose in the urine. The ECG revealed changes in QRS waves, ST segments and T waves suggestive of both hypothermia and hypoxia. The EEG was normal. All of these returned to normal within five days. (Author)

A71-15059 Rapid method for implantation of brain electrodes. Anthony M. Dymond (California, University, Los Angeles, Calif.) and John M. Jurist (Wisconsin, University, Madison, Wis.). *Aerospace Medicine,* vol. 41, Dec. 1970, p. 1421, 1422. PHS Grants No. 5T1-MH-6415-11; No. 5T1-GM-796.

A technique is described for simultaneous implantation and fixation of multiple electrodes in the brain of the cat. This method, which requires less than two hours of surgery, involves mounting a preassembled, stereotaxically loaded, preconnected electrode and pedestal assembly on the skull, and is useful in experimental situations where electrode placement is purely on a stereotaxic basis. In addition to a total surgery time almost independent of the number of electrodes being implanted, this method allows testing of the electrodes and connections prior to surgery. (Author)

A71-15087 O2 exchange across spleen during asphyxia. Neil S. Cherniack, Norman H. Edelman, and Alfred P. Fishman (Pennsylvania, University, Philadelphia, Pa.). *American Journal of Physiology,* vol. 219, Dec. 1970, p. 1585-1589. 23 refs. NIH Grants No. HE-10979; No. HE-12962; No. HE-08805.

Experimental study of the O2 balance of the intact and the denervated spleen of the dog during asphyxia. The spleen, as a source of O2, was studied in 16 anesthetized dogs. Continuous measurement of splenic arterial and venous blood flows and periodic determina-

tions of arterial and splenic venous blood gas composition allowed calculation of the quantity of O2 discharged by the spleen into the blood during asphyxia. Results from eight dogs with intact spleens were compared with those obtained in eight other dogs in which splenic contraction was prevented. The results indicate that the spleen seems to act as a source of O2 during acute hypoxia both by contracting and thereby increasing the number of red blood cells and by releasing red blood cells richer in oxygen than those entering the spleen. O.H.

A71-15088 **Effect of angiotensin I on intrarenal blood flow distribution.** Serge Carrière and Pierre Biron (Montréal, Université, Montreal, Canada). *American Journal of Physiology,* vol. 219, Dec. 1970, p. 1642-1646. 15 refs. Research supported by the Medical Research Council of Canada and the Quebec Heart Foundation.

The intrarenal infusion of angiotensin I (388 ng/min) produces a slight decrease of the cortical blood flow rate without affecting the outer medullary blood flow. The krypton 85 method and autoradiography demonstrated that on most occasions cortical blood flow is uniformly decreased. Angiotensin I also produces a significant decrease in urine volume, sodium excretion, and C sub PAH in the experimental kidney without affecting the C sub Cr. As the effects of angiotensin I were observed only in the kidney in which it was perfused, it is suggested that angiotensin I may produce local effects on the renal vascular bed and renal function without its prior conversion into angiotensin II by extrarenal tissues. It is also suggested that the observed effects are due to the intrarenal conversion of angiotensin I, although a direct effect of the decapeptide upon the renal vessels cannot be excluded. (Author)

A71-15089 **Computer simulation of intestinal slow-wave frequency gradient.** N. E. Diamant, P. K. Rose (Toronto Western Hospital, Toronto, Canada), and E. J. Davison (Toronto, University, Toronto, Canada). *American Journal of Physiology,* vol. 219, Dec. 1970, p. 1684-1690. 20 refs. Medical Research Council Grants No. MA 3353; No. ME 3349.

By means of a digital computer a series of Van der Pol relaxation oscillators with successively decreasing frequencies was loosely coupled, with provision for alteration of coupling between oscillators. The model was then used to explore the validity of the hypothesis that intestinal muscle behaves electrically as a series of loosely coupled oscillators. The computer simulation was successful in reproducing many of the biological observations previously made and in supporting other features proposed by the hypothesis: (a) a step-wise frequency gradient was demonstrated with zones of waxing and waning of activity at the start of each frequency plateau; (b) the degree of coupling between oscillators was the most important factor in determining how the intrinsic frequency gradient was manifest. Frequency plateau length, 'frequency pulling' between adjacent frequency plateaus, simulated propagation velocity, and the degree of waxing and waning of oscillator outputs were all affected by the degree of coupling; and (c) the model allowed further speculation as to the nature of the waxing and waning zone seen in vivo and as to the causes for decreasing propagation velocity along the intestine. (Author)

A71-15090 **Combined effect of carotid sinus hypotension and digestion on splanchnic circulation.** Arnost Fronek (California, University, La Jolla, Calif.; Pennsylvania, University, Philadelphia, Pa.). *American Journal of Physiology,* vol. 219, Dec. 1970, p. 1759-1762. 15 refs.

A gradual carotid sinus hypotension was produced in seven nonanesthetized dogs. In these experiments, ascending aortic blood flow, superior mesenteric artery flow, and aortic blood pressure were recorded. An increase in total peripheral and regional resistance has been observed, but no correlation could be established between the increase in arterial blood pressure and cardiac output. The regional vasoconstrictor response induced by the carotid sinus hypotension under fasting conditions has been compared to that during digestion. The vasomotor response was not influenced by the local vasodilation induced by digestion. It is concluded that both stimuli (under the described experimental conditions) seem to be biologically equally strong. (Author)

A71-15091 **Effect of local cooling on responsiveness of muscular and cutaneous arteries and veins.** Wadie A. Abdel-Sayed, Francois M. Abboud (Iowa, University, Iowa City, Iowa), and Manuel G. Calvelo. *American Journal of Physiology,* vol. 219, Dec. 1970, p. 1772-1778. 19 refs. Research supported by the American Heart Association and the Iowa Heart Association; PHS Grants No. HE-09835; No. HE-02644.

Experimental study of the effect of local cooling on arteries and veins of two different vascular beds in mongrel dogs, i.e., a cutaneous bed, namely, the paw, and the muscular bed, namely, the gracilis. The experimental methods used and the results obtained are described. A detailed discussion of the results is presented showing that the thermosensitivity differs in arterial and venous segments of cutaneous and muscular beds. Cooling is shown to favor redistribution of blood flow away from cutaneous and into muscular vessels. O.H.

A71-15092 **Cerebral oxygenation and metabolism during progressive hyperthermia.** E. M. Nemoto and H. M. Frankel (Rutgers University, New Brunswick, N.J.). *American Journal of Physiology,* vol. 219, Dec. 1970, p. 1784-1788. 47 refs. Army-supported research.

Cerebral blood flow (CBF), cerebral oxygen (CMRO2) and glucose (CMR sub Glu) consumption, and an aerobic index (OGI) were determined at rectal temperatures (T sub re) of 38, 40, 42, and 43 C in dogs. At control T sub re (38 C) mean values for these variables were 44.3 plus or minus 3.1 ml/100 g per min, 3.8 plus or minus 0.4 ml/100 g per min, 7.8 plus or minus 0.8 mg/100 g per min, and 73 plus or minus 9%, respectively. When T sub re was 42 C, CMRO2 was increased significantly and CMR sub Glu was not changed compared to control. At 43 C, CMRO2 and CMR sub Glu were reduced compared with values at 42 C. Aerobic index did not decrease at elevated T sub re. From these results, it was concluded that cerebral hypoxia did not develop during progressive hyperthermia. Failure of cerebral metabolism in the absence of hypoxia could result from a limited supply of nucleotides required in cerebral glucose transport and is suggested as a possible model for further investigation. (Author)

A71-15093 **Spinal mediation of vasomotor reflexes in animals with intact brain studied by electrophysiological methods.** Vladimir M. Khaiutin and Elena V. Lukoshkova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Pflügers Archiv,* vol. 321, no. 3, 1970, p. 197-222. 50 refs.

Study of reflex responses in postganglionic nerves of kidney and heart evoked by the stimulation of various somatic and mesenteric nerves in intact and spinal cats. In intact anesthetized animals two types of responses were found: responses with a latency of 70 to 140 msec and responses with a latency exceeding 250 msec. Both these responses may persist in spinal preparations. To determine the level of mediation of afferent impulses in animals with intact brain, the latencies of responses in the renal and inferior cardiac nerves to stimulation of A-fibers of the spinal nerves T sub 10, T sub 4 and C sub 2 were compared. It was shown that the relation between latencies of these reflexes may be explained only by their spinal mediation. Possible reasons for the decrease or disappearance of reflex responses in the postganglionic cardiac and vascular nerves after spinalization and the role of the bulbar vasomotor region in evoking these responses in animals with an intact brain are discussed. (Author)

A71-15094 Studies on the ascending pathways from the thermosensitive region of the spinal cord. W. Wünnenberg and K. Brück (Marburg, Universität, Marburg an der Lahn, West Germany). *Pflügers Archiv,* vol. 321, no. 3, 1970, p. 233-241. 23 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Study of the ascending pathways from the spinal thermosensitive region in young guinea pigs by means of microelectrode recording and microelectrocoagulation. In the first series of studies, impulse frequency was recorded from single units of the spinothalamic tract which responded to a temperature rise in the spinal segments C sub 5 to T sub 2 with an increase of discharge frequency. At a spinal cord temperature of 38 to 39 C these units showed a firing rate of 1 to 5 pulses/sec; local heating of the spinal cord to 40 to 41 C caused an increase in discharge frequency to 20 to 25 pulses/sec. The mean static impulse frequency was 3 pulses/sec at a spinal cord temperature of 39 C, and 10 pulses/sec at a spinal cord temperature of 42.5 C. In the second series of studies bilateral rf-coagulations were carried out at different sites of the diencephalon. These experiments showed that the ascending fibers from the spinal thermosensitive region connect the thermosensitive spinal region with a hypothalamic 'temperature control center.' (Author)

A71-15151 Central and peripheral stimuli regulating sweating during intermittent work in men. Carl Gisolfi and Sid Robinson (Indiana University, Bloomington, Ind.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 761-768. 29 refs. Contract No. DA-49-193-MD-2449.

Experiments were designed to determine the time relations between the sweating responses of men in hard treadmill work and corresponding temperature changes of skin, rectum, gastrocnemius muscle, and of blood in the femoral and saphenous leg veins. When the men were cool before starting work, the latent period of the onset of sweating was 6-8 min. However, sweating started to increase within 1-2 sec after work began when the subject had either a warm core, a warm skin, or both before starting. When work stopped, sweating in two of the men began to decline in 1-2 sec; but when the central temperature of the third man was elevated (38 deg C) by previous work he generally showed a brief, continued rise of sweating followed by a rapid decline. The brief latent periods of the sweating responses after the start and stop of work indicate a nonthermal neural activation of sweating operating on a background of either a warm core, a warm skin, or both. The data provide evidence that skin temperature, central temperature, and neuromuscular reflexes all participate in the regulation of sweating in treadmill exercise. Possible thermoreceptors in the deep leg veins and muscles may play facilatory roles. (Author)

A71-15152 Instantaneous cardiac acceleration in man induced by a voluntary muscle contraction. J. K. Petro, A. P. Hollander, and L. N. Bouman (Amsterdam, Universiteit, Amsterdam, Netherlands). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 794-798. 29 refs.

The rapidity of heart rate response to a muscular contraction was studied in 13 healthy subjects. In 95% of the contractions a short isometric contraction of the flexor muscles of the arm was followed by a shortening of the first cardiac interval following the onset of the contraction. The same interval in which the contraction started was also shortened, but only if the contraction began early in the interval. Influences of anticipation, alarm, and respiration on the heart rate could reasonably be excluded. Consequently, the muscular contraction gave rise almost instantaneously to an acceleration of the heart rate. On account of these results we assumed that the latency between the contraction and the cardiac acceleration was in the order of 0.5 sec. On the strength of data from the literature it was suggested that the muscle spindles might be involved in a reflex decrease of vagal dominance by a muscular contraction. (Author)

A71-15153 Heart rates during 24 hours of usual activity for 100 normal men. Seymour Glagov, Donald A. Rowley, D. Bryant Cramer, and Robert G. Page (Chicago, University, Chicago, Ill.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 799-805. 18 refs. Research supported by the Chicago Heart Association; PHS Grant No. FR-00013; Contract No. AF 41(657)-379.

Measurement of heart rates in men by means of unencumbering and self-contained miniature cumulative counters activated by the electrical signal obtained from precordial electrodes. Heartbeats were recorded on a modified watch dial face which could be read at intervals by the subjects wearing the counters. Counters and electrodes operated satisfactorily more than 90% of the time and entirely successful 24-hr runs were obtained 352 times in 428 attempts on 126 volunteers. Two or more 24-hr heart rates were obtained on each of 100 normal men aged 17 to 70 yr. Mean 24-hr rates were independent of age and were fairly stable for individuals over a period of several months. Average minute rates awake and asleep and average minute rates during approximately hourly intervals while awake were calculated from records kept by the subjects. In general, average rates awake or asleep and interval rates for comparable activities paralleled 24-hr heart rates. This technique provides new kinds of data for correlating heart rates over extended periods and under a variety of environmental conditions with other physiological functions, for evaluating disease states or for monitoring therapeutic regimens. M.M.

A71-15154 FFA mobilization during and after prolonged severe muscular work in men. E. D. R. Pruett (Institute of Work Physiology, Oslo, Norway). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 809-815. 28 refs. Research supported by the Borregaard Research Fund and the Norges Almenvitenskapelige Forskningsråd.

Study of postabsorptive, healthy young men at rest and during and after exercise at four different work loads representing up to 90% of their maximum oxygen uptake. After work stop, an infusion of glucose was administered. At work loads up to 70% maximum oxygen uptake plasma FFA levels increased during exercise, while blood lactate levels increased only slightly. At 85 to 90% maximum oxygen uptake plasma FFA levels fell and remained low until after work stop, whereas lactate levels rose. Glucose infusion reduced FFA levels for as long as blood glucose and immunoreactive insulin (IRI) levels remained elevated, whereupon plasma FFA again increased. After work at 85 to 90% maximum oxygen uptake plasma FFA remained elevated for more than five hours after work stop, and a large A-V difference was observed. The magnitude and duration of the FFA increase after work was apparently not dependent upon the total energy expenditure, but rather upon the rate of energy expenditure during the exercise - i.e., the severity of the work load as related to the subjects' maximum oxygen uptake. (Author)

A71-15155 Reduction of blood volume by voluntary hyperventilation. P. W. Straub and A. A. Bühlmann (Zürich, Universität, Zurich, Switzerland). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 816, 817. 8 refs. Swiss National Fund for Scientific Research Grant No. 4697.

A 20-min voluntary hyperventilation, documented by the typical arterial blood gas changes, led to an increase of pulse rate, a 5.6% decrease of the plasma volume (amounting to an average of 150 ml) and to a 5.2% increase of the serum protein concentration. These changes were statistically significant not only as compared to the individual values before hyperventilation, but also in comparison with the corresponding changes observed in a control group of seven normal individuals without hyperventilation. These circulatory effects of hyperventilation may play a role in the recently observed hypovolemia of status asthmaticus and in other conditions occasionally or usually associated with hyperventilation. (Author)

A71-15156 Central circulation during submaximal work preceded by heavy exercise. L. Howard Hartley, Bengt Pernow, Jan Häggendal, Jean Lacour, Jacques de Lattre, and Bengt Saltin (Gymnastik- Och Idrottshögskolan; Kungl. Karolinska Institutet, Stockholm; Göteborg, Universitet, Göteborg, Sweden). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 818-823. 22 refs. Research supported by the Bank of Sweden, the Swedish National Association Against Heart and Chest Diseases, and the Swedish Medical Research Council.

Study of the effects of preceding heavy work upon the central hemodynamics and upon the autonomic nervous system in the endeavor to define the mechanism of ensuing heart rate changes. The results obtained indicate that the heart rate and stroke volume changes, induced by previous short-duration heavy work, occur in the absence of ventricular filling pressure decrements and may be mediated through withdrawal of parasympathetic tone. M.V.E.

A71-15157 # Diurnal patterns of rats determined by calorimetry under controlled conditions. William W. Lackey, Leopold A. Broome, James A. Goetting, and David A. Vaughan (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 824-829. 17 refs.

Measurement of actual heat output, oxygen consumption, and carbon dioxide production in rats allowed free movement over a 24-hr period. By manipulating feeding patterns, it has been attempted to demonstrate how patterns of heat output and the other parameters may be altered as a result of a forced change in eating habits. It is expected that these measurements may provide data which will be useful as a base line for future studies of drug metabolism. M.V.E.

A71-15158 Direct evaluation of convective heat transfer coefficient by naphthalene sublimation. Y. Nishi (J. B. Pierce Foundation Laboratory, New Haven, Conn.) and A. P. Gagge (Yale University, New Haven, Conn.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 830-838. 32 refs. NIH Grant No. 5-P01-ES-00354-02.

Description of a novel method for direct measurement of the convective heat transfer coefficient. This method is applicable to human subjects during both rest and exercise and does not depend on any measurements of temperature or energy normally used in human calorimetry. It is based on the observation that the convective heat transfer coefficient is directly proportional to the sublimation rate of a small naphthalene ball placed near but not on the body. It is demonstrated for four types of activity: resting-sitting, bicycle exercise, treadmill exercise, and free walking. The results obtained agree with comparable values from partitional calorimetry. M.V.E.

A71-15159 Exhausting work limited by external resistance and inhalation of carbon dioxide. F. N. Craig, W. V. Blevins, and E. G. Cummings (U.S. Army, Medical Research Laboratory, Edgewood Arsenal, Md.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 847-851. 10 refs.

Experimental search for respiratory features, accompanying or following exhausting work, apt to give a subject some conscious or unconscious warning of his impending exhaustion, and study of the relation of work load to decrement in performance. The results obtained include some indication that the approach of a minimum time for expiration contributes in a certain way to a subject's awareness of impending exhaustion. M.V.E.

A71-15160 Thermal response of human legs during cooling. John W. Mitchell, Timoteo L. Galvez, James Hengle, Glen E. Myers, and Karl L. Siebecker (Wisconsin, University, Madison, Wis.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 859-865. 15 refs. Research supported by the University of Wisconsin and the Wisconsin Alumni Research Foundation.

Development of an analytical model for predicting temperature levels as a function of time in human legs during cooling. The model results are supported by tests on patients prior to leg amputations and on healthy subjects. The leg cools passively, with blood flow rate and leg diameter having a strong influence on the temperature levels and the time to cool, while metabolism, bone size, and leg length have insignificant effects. The time to cool a leg to essentially a steady-state condition is a function of diameter only. (Author)

A71-15161 Tidal volume and respiratory rate changes at start and end of exercise. William L. Beaver and Karlman Wasserman (Varian Associates, Palo Alto; Harbor General Hospital, Torrance; California, University, Los Angeles, Calif.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 872-876. 9 refs. Research supported by Varian Associates; PHS Grant No. HE-11907.

Experimental study of the relative contributions of the two primary determinants, tidal volume and breathing frequency, to minute ventilation at exercise transients, and determination of the effect of work duration on the transients for each subject. The results obtained suggest that abrupt transient changes are learned and not a fundamental part of the control mechanism of the hyperpnea of exercise. M.V.E.

A71-15162 Rebreathing measurements of pulmonary diffusing capacity for CO during exercise. W. H. Lawson, Jr. (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 896-900. 43 refs.

Measurement of the apparent pulmonary diffusing capacity for CO (D sub CO) in five young men with a rebreathing method at rest and during exercise on a bicycle ergometer that included maximal tolerated work loads. Rebreathing time was less than 20 sec, and rebreathing bag P sub CO2 at midsampling time ranged from 45 to 70 mm Hg. A reduction in rebreathing bag P sub CO2 during exercise to beneath resting rebreathing levels, utilizing a CO2 absorber, had little if any effect on D sub CO. Rebreathing D sub CO agreed with breath-holding D sub CO if breath holding was done at lung volume similar to average rebreathing lung volume, which approximated functional residual capacity plus one-half tidal volume. There was a linear relationship between D sub CO and oxygen consumption. Published results for both breath-holding and steady-state D sub CO during exercise also show a linear relationship with oxygen consumption. (Author)

A71-15163 FM converter for tape recording of low-frequency biological data. W. Morton Caldwell, Michael E. Whiting, and Allen B. Judy (West Virginia University, Morgantown, W. Va.). *Journal of Applied Physiology,* vol. 29, Dec. 1970, p. 901-903. Research supported by the West Virginia Heart Association.

A converter for the recording of steady-state and low-frequency biological data by inexpensive audio tape recorders is described. The system functions by transforming the amplitude variations of the input data into an FM signal acceptable to the recorder. The design, simplified by the use of operational amplifiers and integrated circuits, compares with instrumentation data recorders in accuracy and stability. (Author)

A71-15164 Simultaneous comparison and calibration of the Doppler and electromagnetic flowmeters. Stephen F. Vatner (California, University, San Diego, Calif.), Dean Franklin (Scripps Clinic and Research Foundation, La Jolla, Calif.), and Robert L. VanCitters (Washington, University, Seattle, Wash.). *Journal of*

Applied Physiology, vol. 29, Dec. 1970, p. 907-910. 11 refs. NIH Grants No. HE-12373; No. HE-08337; No. HE-05147-12; No. HE-07293; No. HE-08433.

The ultrasonic Doppler telemetry flowmeter and an electromagnetic flowmeter were simultaneously compared and calibrated in vivo and in vitro. Measurements were made 2-4 weeks after recovery from surgical implantation of series-mounted ultrasonic Doppler and electromagnetic flow probes of identical internal dimensions on a peripheral artery in intact unanesthetized dogs. Both flowmeters were linear over flow ranges seen in the peripheral circulations. The advantages of the electromagnetic included the ability to sense reverse flow and an insensitivity to changes in velocity profile. The advantages of the ultrasonic Doppler included knowledge of zero flow without occluders and the capability for telemetry. Within the constraints of the experimental conditions observed, both flowmeters were found suitable for the assessment of regional blood flow in the peripheral circulation in conscious animals. (Author)

A71-15165 Catheter-flush system for continuous monitoring of central arterial pulse waveform. Reed M. Gardner, Homer R. Warner, Alan F. Toronto, and Walter D. Gaisford (Utah, University; Latter-Day Saints Hospital, Salt Lake City, Utah). *Journal of Applied Physiology*, vol. 29, Dec. 1970, p. 911-913. 9 refs. Research supported by the Intermountain Regional Medical Program; NIH Grant No. RR-00012-09.

Described in this article are a catheter and flushing system for continuous monitoring of central arterial pulse waveform. The catheter and its introduction system has greatly simplified and facilitated introduction of catheters into human patients while the flush system has permitted long-term (greater than 2 weeks) measurement of central arterial pressure without the usual complications. Experience with over 2500 patients has shown the scheme to be reliable and the complication rate to be negligible. (Author)

A71-15166 Hybrid computer programming for study of cardiac excitation. Paul J. Martin (Mount Sinai Hospital; Case-Western-Reserve University, Cleveland, Ohio). *Journal of Applied Physiology*, vol. 29, Dec. 1970, p. 917-923. Research supported by the American Heart Association; PHS Grant No. HE-10951.

Analog/hybrid programming techniques are described which facilitate the quantitative study of: (1) the dependence of the PR interval response upon the point within the cardiac cycle at which a vagal stimulus is given; (2) the relative response amplitude and summation properties of independent left and right vagal stimulations; (3) the PR interval summation properties of two vagal stimuli placed at arbitrary relative positions within a cardiac cycle; (4) the summation properties of the PR interval response to vagal stimuli placed at identical points in from one to four contiguous cardiac cycles; (5) the dependence of the PR interval response to one stimulus upon an identical stimulus placed a variable number of cardiac cycles before. The computer program utilizes several novel techniques which may be of benefit to other workers with similar to lesser computer facilities, and who need to maintain precise on-line control of experimental parameters, sequences and analyses. (Author)

A71-15169 The Haxo and Blinks electrode. G. Gingras and J. P. Samson (Montréal, Université, Montreal, Canada). *Biophysical Journal*, vol. 10, Dec. 1970, p. 1189-1205. 8 refs. Research supported by the National Research Council of Canada.

Fick's diffusion equations have been solved for the Haxo and Blinks electrochemical determination of photosynthetic O2 evolution. The model shows the method to be quantitative in the case of a 'long' chamber measuring constant rate of O2 evolution. Transients are amplitude distorted by an amount depending on the space distribution of the O2 sources. A correction equation applied to the raw data permits the recovery of the original signal. (Author)

A71-15170 Some evidence for a visual slant averaging mechanism. William D. Groman and Robert W. Worsham (Virginia Commonwealth University, Richmond, Va.). *Psychonomic Science*, vol. 21, Nov. 25, 1970, p. 221-223. 12 refs.

It was hypothesized that when two surfaces at different angles of slant were presented stereoscopically, the resulting percept would be a single slanted surface seen at an angle equal to the mean slant of the stimulus objects. Fifteen Ss were tested on the Groman binocular disparator under 15 different conditions of disparity, ranging from -20 deg to +20 deg. Ten judgments were made for each condition in a random order. The stimulus cards were two 3 x 4 in. white cards ruled into 1/2-in. squares. Each exposure was 2 sec in duration. Following exposure E manipulated a test card until S indicated that it was at the same angle as the preceding perceived slant. The results strongly supported the hypothesis. They were discussed in terms of a gradient theory of slant perception and a neurophysiological averaging mechanism. (Author)

A71-15261 # Chemistry, physics and mathematics of life (Khimiia, fizika i matematika zhizni). Victor Săhleanu. Bucharest, Editura Ştiinţifică, 1970. 516 p. In Russian. (Translation).

A Russian translation of a book by a Rumanian physician concerning the chemical, physical and mathematical aspects of the living world. The topics discussed include the evolution of the concepts of life, the composition and physical chemistry of living organisms, the metabolic processes as a fundamental characteristic of life, the structural levels of living matter, biological cycles and rhythms, molecular physiology, and heredity biochemistry and mathematics. Also covered are the cybernetics of living systems, the quality/quantity and optimality concepts in biology, the chemistry and physics of immunity and adaptation, chemical pathology, the growth, aging and death of organisms, and the origin and development of life in the universe. The book is addressed to the general reader with some knowledge of natural sciences. V.Z.

A71-15263 Biometry (Biometriia) (2nd edition). N. A. Plokhinskii. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1970. 368 p. 11 refs. In Russian.

The statistical analysis of group properties in biology is explained systematically by an outline of statistical and probabilistic techniques modified to suit the specific demands of biological research. Initial sections delineate methods of determining means and diversity indices and provide an introduction to correlation, dispersion analysis, and simple rectilinear regression. More complex methods of determining mean levels, diversities, and distributions are then examined. Special attention is given to (1) modern methods of determining the significance of differences between means and shares, (2) special dispersion analysis procedures, (3) empirical formulas of simple, complex, rectilinear, and curvilinear regression analyses, and (4) certain methods of nonparametric statistics. A special section on algorithms provides a compact, systematic, and illustrated description of operations required to obtain the biometric indices discussed in previous chapters. The inclusion of this material made it possible to separate the preceding theoretical concepts from a technical description of calculation procedures. Many practical recommendations are included for using these methods. A set of mathematical and statistical tables is given for simplifying and standardizing the biological calculations. T.M.

A71-15269 * Changes in appearance, volume and activity during the early stages of disintegration in isolated chloroplasts. Götz Harnischfeger (Florida State University, Tallahassee, Fla.). *Planta*, vol. 92, 1970, p. 164-177. 22 refs. Grant No. NGR-10-004-018.

Successive stages in the disintegration of tobacco chloroplasts isolated in sucrose phosphate buffer were followed in a series of scanning and sectioning electron micrographs. Changes of particle

size and rates of the photochemical reduction of 2,6-dichlorophenol-indophenol (DPIP) were measured simultaneously. An orderly correlation exists between the stepwise degradation of structure, volume and metabolism. Volume changes of purely osmotic origin influence the Hill reaction. At some intermediate point structural alterations begin to interfere with the proper utilization of absorbed light energy. A temporary difference of efficiency suddenly appears for DPIP reduction going on in blue and red saturating illumination. It disappears again some time later when a still lower level of reaction rates has been reached. This event depends solely on the osmotic strength of the suspension medium and can be temporarily reversed by increasing the solute concentration of the latter. (Author)

A71-15270 • Transient light effects in the Hill reaction of disintegrating chloroplasts in vitro. G. Harnischfeger and H. Gaffron (Florida State University, Tallahassee, Fla.). *Planta*, vol. 93, 1970, p. 89-105. 30 refs. Grant No. NGR-10-004-018.

Study of the transient color sensitivity observed in the Hill reaction of disintegrating chloroplasts (red-blue effect). The results obtained suggest that, when the light energy absorbed by the detached pigment cannot be utilized in a normal way, this light energy promotes destructive sensitization processes which attack part of the electron transport system. M.V.E.

A71-15280 • Space Base Biomedical Center. Orval H. Minney (General Electric Co., Space Div., Valley Forge, Pa.). In: Space sciences - .Future applications for mankind; Vandenberg Scientific and Technical Societies Council, Western Space Congress, 1st, Santa Maria, Calif., October 27-29, 1970, Proceedings. Part 1. (A71-15276 04-31) North Hollywood, Calif., Western Periodicals Co., 1970, p. 30-39. 9 refs. NASA-supported research.

The General Electric Space Division's contract with NASA for an Integrated Medical and Behavioral Laboratory Measurement System (IMBLMS) is pointed toward assessing man's health and well being for future extended manned space missions. A Space Base central medical facility is envisioned which will provide immediate emergency and infirmary care for construction workers, operating and service personnel, and visitors. In addition, the Biomedical Center will provide paramedical services and conduct medical and bioscience research where the use of unique features of the Space Base environment contribute to the investigation. The application of the IMBLMS concept to public health is discussed in order to bring to public attention the potentiality and application of space technology and systems methodology to hospital and health center planning, construction, equipping and utilization. (Author)

A71-15281 • Application of aerospace technology to medicine. F. Thomas Wooten (Research Triangle Institute, Research Triangle Park, N.C.). In: Space sciences - Future applications for mankind; Vandenberg Scientific and Technical Societies Council, Western Space Congress, 1st, Santa Maria, Calif., October 27-29, 1970, Proceedings. Part 1. (A71-15276 04-31) North Hollywood, Calif., Western Periodicals Co., 1970, p. 40-45. NASA-sponsored research.

Results of a program sponsored by NASA which is designed to transfer, as quickly as possible, new technology developed in the aerospace field of medicine. Using a multidisciplinary team of engineers and scientists (Biomedical Application Team) medical research problems are identified by personal interaction between the team and scientists in medical centers throughout the country. New insights into the process of technology transfer, as well as specific examples of the success of this program, are presented. F.R.L.

A71-15282 • Computerized anatomical model man for analyses of radiation doses. Paul G. Kase and Lois M. Ryan (Martin Marietta Corp., Denver, Colo.). In: Space sciences - Future applications for mankind; Vandenberg Scientific and Technical Societies Council, Western Space Congress, 1st, Santa Maria, Calif., October 27-29, 1970, Proceedings. Part 1. (A71-15276 04-31) North Hollywood, Calif., Western Periodicals Co., 1970, p. 46-65. 17 refs. NASA-supported research; Contract No. AF 29(601)-69-C-0052.

This report describes the development of a detailed, computerized, radiation-shielding model of the human body, and examples relating it to the planning of space missions. The model has two configurations (standing and seated), and more than 2200 individual geometric shapes are used to depict the external conformation, skeleton, and principal organs. The exterior dimensions are those of the 50th-percentile Air Force man, and the skeleton and organs were scaled to conform from life-size models. (Author)

A71-15283 Space sickness - Its causes and possible prevention. Robert Mayne (Arizona State University, Tempe, Ariz.). In: Space sciences - Future applications for mankind; Vandenberg Scientific and Technical Societies Council, Western Space Congress, 1st, Santa Maria, Calif., October 27-29, 1970, Proceedings. Part 1. (A71-15276 04-31) North Hollywood, Calif., Western Periodicals Co., 1970, p. 66-92. 59 refs.

Discussion of the problem of space motion sickness, its causality and possible preventive methods for space disturbances. A hypothesis is advanced regarding the etiology of motion sickness-type syndromes, and the psychophysiological context in which this hypothesis, vestibular mechanics and adaptation may be set is discussed. A technique is proposed for preconditioning man for the space environment which may provide an additional margin of safety to future space exploration, particularly when astronauts must be selected among nonprofessional jet pilots. M.M.

A71-15346 Making Venus habitable - The promise of planetary engineering. Matthew F. Norton (American University, Washington, D.C.). In: Space sciences - Future applications for mankind; Vandenberg Scientific and Technical Societies Council, Western Space Congress, 1st, Santa Maria, Calif., October 27-29, 1970, Proceedings. Part 2. (A71-15316 04-07) North Hollywood, Calif., Western Periodicals Co., 1970, p. 1011-1020. 25 refs.

Discussion of the possibility of altering surface conditions of Venus in order to make her habitable for man. It is shown that while surface conditions are not now satisfactory for the maintenance of life, the position of Venus in the solar system and the nature of her atmosphere suggest that this is the only planet which might be made habitable. The major parameters of Venus to be changed are surface temperature, atmosphere, and availability of water. Atmospheric changes can be accomplished by photosynthesis initiated by algae designed to have flotation in the lower clouds and appropriate temperature tolerance. By careful bioengineering, it should be possible to create an atmosphere with sufficient free oxygen for animal life in hundreds, if not tens of years. O.H.

A71-15393 • Results of Apollo 11 and 12 quarantine studies on plants. C. H. Walkinshaw, H. C. Sweet, S. Venketeswaran, and W. H. Horne (NASA, Manned Spacecraft Center, Lunar Receiving Laboratory, Houston, Tex.). *BioScience*, vol. 20, Dec. 15, 1970, p. 1297-1302. 24 refs.

Description of observations made during the botanical quarantine studies of Apollo 11 and 12 lunar materials, designed to determine whether lunar material contained any agent capable of generating an epiphytotic disease in representative species of the plant kingdom. In these tests, 35 representative plant species grown under controlled aseptic conditions were studied. Four systems were employed which included algae, spores, seeds, gametophytes, seedlings, and tissue cultures of higher plants. A number of beneficial effects were observed, and none were found to be associated with an infectious process. The absence of microorganisms or any harmful substance suggests that lunar material could be used as a support

media for the growth of many plants. The tests also indicate that ferns, liverworts, and tobacco cultures utilize lunar material as a source of nutrients. O.H.

A71-15411 # **Adverse effects of downwash upon man.** William P. Schane (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.). In: American Helicopter Society, American Institute of Aeronautics and Astronautics, and University of Texas, Joint Symposium on Environmental Effects on VTOL Designs, Arlington, Tex., November 16-18, 1970, Proceedings. (A71-15401 04-02) New York, American Helicopter Society, Inc., 1970. 7 p. 34 refs.

Discussion of some adverse effects of aircraft downwash upon man as suggested in aviation literature. The following effects are considered: tissue damage due to downwash per se and due to secondary effects of downwash; energy costs imposed by working in a high wind environment; massive convective heat loss caused by exposure to downwash; impaired work capabilities due to disruption of equilibrium due to high and gusty winds; effects of physically, chemically, and microbially active dust; effects of the high sound pressure levels; and interaction of downwash and the impedimenta of man. O.H.

A71-15422 # **Exploratory study of pilot performance during high ambient temperatures/humidity.** Stephen Moreland (U.S. Army, Directorate of Flight Standards and Qualification, St. Louis, Mo.). In: American Helicopter Society, American Institute of Aeronautics and Astronautics, and University of Texas, Joint Symposium on Environmental Effects on VTOL Designs, Arlington, Tex., November 16-18, 1970, Proceedings. (A71-15401 04-02) New York, American Helicopter Society, Inc., 1970. 17 p. 17 refs.

Exploration of techniques capable to provide quantifiable data describing human performance changes under high cabin temperatures, and study of actual pilot performance in a hot environment. A prototype OH-6A helicopter was instrumented as the test vehicle. Limited aircraft and pilot availability allowed only four subjects to be used during the study, and the obtained results should therefore be considered only as trends. The described techniques used did successfully measure both a large portion of total pilot performance and the cockpit environment. Though environmental variables could not be controlled, they could be accounted for, measured, and correlated with other variables using a multiple-regression program. While the techniques employed and the results obtained should be further verified, it is felt that this study provides a good baseline from which to structure future inflight research. M.V.E.

A71-15460 • **Analytical modeling of the thermal behavior of living human tissue.** Avraham Shitzer and John C. Chato (Illinois, University, Urbana, Ill.). In: Heat transfer 1970; Assembly for International Heat Transfer Conferences, International Heat Transfer Conference, 4th, Versailles, France, August 31-September 5, 1970, Preprints. Volume 1 - Conduction (Sessions Cu 1-Cu 3); Heat exchangers (Sessions HE 1, HE 2). (A71-15451 04-33) Edited by Ulrich Grigull and Erich Hahne. Amsterdam, Elsevier Publishing Co., 1970, p. Cu 3.9.1-Cu 3.9.10. 5 refs. Research supported by the Hebrew Technical Institute; Grant No. NGR-14-005-103.

The thermal behavior of living biological tissues has been modeled. The model allows for inclusions of the effects of internal heat generation and blood flow. Steady state analytical solutions have been obtained for several boundary conditions and for various values of the parameters involved. These solutions show the significance of the blood flow on the temperature distribution. Particular applications were directed to the problem of cooling of the skin surface by direct contact, such as with cooling tubes used in extravehicular space suits. Temperature profiles obtained by these analytical methods compared favorably with the scant experimental data and previous numerical solutions obtained. The results in general provide insight into the influence of various parameters on the effectiveness of various cooling schemes. (Author)

A71-15572 # **Changes of the gas exchange in persons in local temperature effects (Sdvigi gazoobmena u liudei pri mestnykh temperaturnykh vozdeistviiakh).** T. M. Mugutdinov (Dagestanskii Meditsinskii Institut, Makhachkala, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 35, Oct. 1970, p. 9-11. In Russian.

Changes of the gas exchange in healthy persons were studied before and after local effects of cold and heat. There were noted regular shifts of the gas exchange which depended upon the time of the year. For the purpose of defining the physiological mechanisms of the referred to reaction the author conducted numerous investigations on one and the same man, on patients with thermoanesthesia and on healthy persons in a state of medicinal sleep. Data were obtained testifying to the conditioned reflex nature of the referred to shifts occurring under the influence of repeated local thermal stimuli. (Author)

A71-15573 # **Alteration of the content of amino acids in internal organs of rabbits under the influence of high-frequency electromagnetic and ultrasound oscillations (Izmenenie soderzhaniia aminokislot vo vnutrennikh organakh krolikov pod vliianiem vysokochastotnykh elektromagnitnykh i ul'trazvukovykh kolebanii).** K. G. Vibe, E. P. Miroedova, S. P. Kulachenko, and V. R. Faitel'berg-Blank (Tselinogradskii Sel'skokhoziaistvennyi Institut; Tselinogradskii Meditsinskii Institut, Tselinograd, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 35, Oct. 1970, p. 47, 48. In Russian.

The effect of high-frequency electromagnetic field and ultrasound changes the total content of free amino acids in internal organs. Small effects of high-frequency field and microwaves cause an increase in the content of free amino acids, whereas large doses, conversely, produce a reduction of their level. Ultrasound caused the greatest changes with a dose of 3 wt/sq cm for five minutes. (Author)

A71-15574 # **The antigenic properties of individual layers of the human vascular wall (Antigennye svoistva otdel'nykh sloev stenki sosudov cheloveka).** M. G. Kishev (Dagestanskii Meditsinskii Institut, Dagestan, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 35, Oct. 1970, p. 74-77. 5 refs. In Russian.

With the aid of the complement fixation reaction, precipitation in agar and immunoelectrophoresis the author studied the antigenic properties of the intima, media and adventitium of unaltered human vessels and in atherosclerosis. In the intima and adventitium there are up to three antigens, of which only one of the three are specific for these layers; in the media there are up to four antigens, of which specific may be only two. It is assumed that extracted connective-tissue proteins and serum proteins may act as identical antigens revealed in different layers. (Author)

A71-15576 Influence of inert gases of the alveolar-arterial O2-difference (Die Beeinflussung der alveolär-arteriellen O2-Druckdifferenz durch inerte Gase). W. Liese, K. Muysers, and J. P. Pichotka (Bonn, Universität, Bonn, West Germany). *Pflügers Archiv,* vol. 321, no. 4, 1970, p. 316-331. 28 refs. In German.

In 10 healthy persons (age 20-35 years) the alveolar-arterial O2 pressure difference was determined during breathing of 20.9% O2 in different inert gases. Alveolar carbon dioxide partial pressure was kept constant during the experiments. The alveolar and inspired O2

partial pressure was determined by continuous mass spectrometric analysis, the arterial O2 pressure by means of microelectrodes with arterialized blood from the ear lobe. Mean AaDO2 was 8.7 torr for N2-O2, 15.3 torr for He-O2 and 16.3 torr for Ar-O2 mixture. The differences are statistically significant. There is no clear correlation to various physical properties of these gases and hence to intrapulmonary mixing. Changes in the distribution of $\dot{V}A/\dot{Q}$ are only hypothetic. (Author)

A71-15577 Respiratory and circulatory effects of 100 meq/l potassium or 2% procaine in the cerebrospinal fluid of cats. J. Berndt, W. Berger, and C. O. Trouth (Ruhr-Universität, Bochum, West Germany). *Pflügers Archiv*, vol. 321, no. 4, 1970, p. 346-363. 14 refs.

Experimental study of respiratory and circulatory responses to a perfusion of the ventral surface of the medulla in lightly anesthetized cats with mock CSF of different potassium concentrations (from 5 to 100 meq/l), or with solutions containing 2% procaine. To study the blockade of different layers of the medullary tissue, electrical stimuli were applied at varying depths from the ventral surface, at a spot located medially from the roots of the hypoglossal nerve, and 3 mm laterally from the midline. It has been found that potassium ions readily diffuse through the extracellular spaces of the medullary tissue. Their immediate effects on respiration cannot, however, be explained by a direct influence on the respiratory centers since these have been demonstrated to be still responding to stimuli after respiration has ceased. In the peripherally denervated animal, ventilation is maintained by the activity of structures located near the ventral surface of the medulla which are not identical with the respiratory centers. In addition, structures which are involved in the control of circulation have to be assumed at a similar location. O.H.

A71-15772 * Theoretical model studies of wave transmission in semicircular canal ducts. M. Anliker (Stanford University, Stanford, Calif.) and M. Dorfman (Stanford University, Stanford; Lockheed Missiles and Space Co., Sunnyvale, Calif.). *Ingenieur-Archiv*, vol. 39, no. 6, 1970, p. 390-406. 15 refs. Research supported by the Lockheed Missiles and Space Co.; Contract No. N 00014-67-A-0112-0007; Grant No. NGR-05-020-223.

Some aspects of the dynamic behavior of semicircular canal ducts are examined by analyzing the wave transmission characteristics of an elastic fluid-filled toroidal shell which is suspended in a rigid fluid-filled toroidal channel. The fluids contained in the elastic and in the rigid channel are considered incompressible and inviscid. Linear equations of motion are derived which interrelate approximately the inertia, elastic and hydrodynamic forces in the system. If we disregard a possible twisting of the elastic torus and bending perpendicular to the plane of the canals, the system is shown to transmit three basic types of waves. The corresponding dispersion curves and mode shapes are computed for a representative set of parameter values and are compared with experimental data obtained from a laboratory model. Certain findings of this investigation are expected to be relevant to a study of the pulse wave in the aortic arch. (Author)

A71-15833 Limiting factors in threshold and suprathreshold vision. George A. Hay and M. Susan Chesters (Leeds University, Leeds, England). *Nature*, vol. 228, Dec. 19, 1970, p. 1216-1218. 10 refs.

Discussion of limiting factors in threshold and suprathreshold vision taking into consideration attempts to measure the contrast loss for object details of various sizes in suprathreshold conditions. The investigations suggest that the quality of suprathreshold vision in the fovea results from a balance between optical unsharpness (a function of pupil diameter) and neural 'oversharpness' (lateral inhibition). The findings seem to invalidate previous estimates of retinal receptive field sizes and of other related neural parameters which have been made without consideration of optical unsharpness. G.R.

A71-15844 A stereometric system for measuring human motion. M. A. Ayoub, M. M. Ayoub, and J. D. Ramsey (Texas Technological University, Lubbock, Tex.). *Human Factors*, vol. 12, Dec. 1970, p. 523-535. 12 refs.

Although several photogrammetric systems are commercially available, their cost limits the application of photogrammetric human factors studies. This paper describes a relatively low cost system developed at Texas Tech University to be used in connection with biomechanics and human performance studies. A detailed description of the basic theoretical and laboratory investigations of the various parameters which influence the design, construction, and use of the system is presented. The adequacy and accuracy of the system were measured by conducting two verification tests under static and dynamic orientations. Typical acceleration and velocity curves for human hand motion, obtained by the system, are presented. (Author)

A71-15845 Practice effects on a visual vigilance task with and without search. W. Peter Colquhoun and Robert S. Edwards (Medical Research Council, Cambridge, England). *Human Factors*, vol. 12, Dec. 1970, p. 537-545. 23 refs. Research supported by the Medical Research Council.

Changes in performance at a visual vigilance task over eight 40-minute sessions were studied in three groups of eight subjects. The task was to inspect a series of displays of small disks for the occasional presence of a disk of slightly greater area than the others. For one group (search), each display consisted of a row of six disks. For one of the two no-search groups, the display contained two adjacent disks, one of which served as a reference standard; for the other group this reference disk was absent. Substantial improvement in overall detection rate occurred in all three groups. Analysis indicated that in each case this improvement was due to a genuine increase in discriminatory efficiency and not to any change in response criterion. Neither search nor the presence or absence of a reference standard appeared to affect the degree of improvement observed to any marked extent. Within-session decrement was observed only in the search group; this decrement was found to result from a change in response criterion, and not from any alteration either in discriminatory efficiency or search strategy. (Author)

A71-15846 Decrement and recovery with repetitive maximal muscular exertions. Lee S. Caldwell (U.S. Army, Medical Research Laboratory, Fort Knox, Ky.). *Human Factors*, vol. 12, Dec. 1970, p. 547-552. 12 refs.

Sixty subjects exerted ten successive maximum pulls of 12-1/2 sec duration on an isometric dynamometer handle. All trials in a series were separated by a constant duration intertrial interval of 12-1/2, 25, 50, 100, or 200 sec. For all intertrial intervals there was a rapid initial reduction in output followed by an essentially linear decline. The effect of the intertrial intervals on the within-trial decrements were quite small with a difference of less than 2% of maximum between the means for the shortest and longest intervals. For the longer rest conditions there was a reduction in the within-trial decrement over trials. For the shorter intertrial intervals, recovery tended to increase with successive rests, but for the longer intervals there was a tendency for recovery to decrease with repeated rests. The amount of strength recovery with rest was found to be influenced not only by the length of rest but also by the degree to which the response was degraded by prior performance. (Author)

A71-15847 The computer operator and his environment. Wilbert O. Galitz (Sperry Rand Corp., Univac Div., Blue Bell, Pa.) and Thomas J. Laska (Sperry Rand Corp., Univac Div., St. Paul, Minn.). *Human Factors*, vol. 12, Dec. 1970, p. 563-573.

To develop an increased understanding of the functioning of the computer operator and how he contributes to total computer system

functioning, operator performance data were collected at a sample of six customer centers using the UNIVAC(R) 1108 and 494 computer systems. In addition, questionnaires were sent to all customer personnel using these systems. Data were collected on the proportion of time operators spend at various system activities, the frequency of usage of different equipment within the computer center, and the frequency of operator movement between system components. Reported operator information requirements are summarized, as are operator biographical data. A suggested computer center layout is presented based upon the collected data. (Author)

A71-15848 **The role of sleep deprivation research in human factors.** Paul Naitoh (U.S. Naval Material Command, Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.) and Richard E. Townsend (Duke University, Durham, N.C.). *Human Factors,* vol. 12, Dec. 1970, p. 575-585. 24 refs. Navy-supported research; NSF Grant No. GB-6008.

Study of the effects of sleep disturbances and sleep loss on task performance. To illustrate these effects, data from four independent research institutes are reviewed and summarized. The summarized research confirms the importance of preventing sleep loss in order to sustain a smooth man-machine interaction. Under circumstances where man cannot avoid incurring sleep loss, then it is important to minimize the effects of sleep debt. A few techiques are available for minimizing the effects of sleep loss on performance: tasks can be reconstructed, and behavioral periodicity and naps can be utilized. Detection and prevention of sleep difficulties are equally desirable. The review also indicates a continuing need for human engineering research to define sleep requirements, and to assure that adequate conditions of sleep can be maintained for men who must work in unfamiliar and hostile environments. O.H.

A71-15849 **The functional relation between alignment accuracy and vertical separation of alignment marks.** Anthony S. Squillace and Ann R. Bien (North American Rockwell Corp., Autonetics Div., Anaheim, Calif.). *Human Factors,* vol. 12, Dec. 1970, p. 599-604.

The purpose of this study was to determine the functional relation between alignment error (horizontal offset of two alignment marks) and the vertical separation distance of the alignment marks when the alignment is attempted. This relation was studied with four types of alignment marks and two extreme levels of ambient illumination. The vertical separations ranged from 0.050 to 3.2 in. A significant interaction was found between vertical separation distance and alignment mark design: designs which provided vernier cues were found to be the most effective at greater vertical separation distances. The relation between alignment error and vertical separation can be described by a third-order polynomial. (Author)

A71-15850 **Effects of alcohol on complex performance.** W. Dean Chiles and Alan E. Jennings (FAA Civil Aeromedical Institute, Oklahoma City, Okla.). *Human Factors,* vol. 12, Dec. 1970, p. 605-612. 10 refs.

Nine subjects were tested on a battery of tasks involving monitoring, two-dimensional compensatory tracking, and mental arithmetic at three levels of work load. The subjects ingested 2.5 ml of 100-proof vodka per kilogram of body weight two hours before testing; mean blood alcohol at the beginning of testing was approximately 100 mg%. Significant alcohol effects were found for two of the monitoring tasks and for three of the four measures of tracking. There was a significant interaction between work load and alcohol in the case of one tracking measure. (Author)

A71-15914 **Shock after acute myocardial infarction - A clinical and hemodynamic profile.** Stephen Scheidt, Robert Ascheim, and Thomas Killip, III (New York Hospital, New York, N.Y.). *American Journal of Cardiology,* vol. 26, Dec. 1970, p. 556-564. 20 refs. NIH Contract No. PH-43-67-1439.

Study of cardiogenic shock by surveying clinical features, predisposing factors, precipitating events, laboratory and hemodynamic observations, pathologic findings, prognostic indicators and the results of therapy for 73 patients in whom shock developed after acute myocardial infarction. The incidence of shock was 15%, and the mortality 86%. It was not possible to differentiate patients with shock from those with acute infarction alone on the basis of age, anamnestic data, delay before hospitalization or anatomic location of infarction. No precipitating cause for shock other than acute infarction itself was consistently present. Hypovolemia, anemia, arrhythmia and drugs could not be incriminated as important factors in the genesis of shock. Delay in onset of shock in many cases suggested progression of cardiac damage after the initial clinical event. Hemodynamic studies in 19 patients showed that cardiac index was less than half of the normal index, stroke volume index about a third of normal, and peripheral resistance generally increased. It is concluded that patients who have the highest risk can be identified from various clinical and hemodynamic observations. O.H.

A71-15915 **Syncope.** J. P. Shillingford (Royal Postgraduate Medical School, London, England). *American Journal of Cardiology,* vol. 26, Dec. 1970, p. 609-612. 22 refs.

Syncope is confined to those conditions in which there is a temporary suspension of consciousness due to the failure of an adequate cerebral blood supply. The failure of blood supply may be due to disturbances of rhythm including atrial tachycardias, atrial bradycardias, ventricular tachycardias and ventricular bradycardias. Syncope may result from obstruction of the blood flow through the heart in cases of severe valvular stenosis, ball valve thrombus or intracardiac tumors. Temporary diminution of cardiac output may occur in certain forms of congenital heart disease. Syncope also occurs as a result of conditions unassociated with conditions of the heart; these include failure of venous return, carotid sinus syncope, obstruction of blood flow through the pulmonary vascular tree and obstruction of the arterial supply to the brain. True syncope has to be differentiated from other cerebral causes of unconsciousness. (Author)

STAR ENTRIES

N71-12285 Michigan Univ., Ann Arbor.
A MATHEMATICAL MODEL OF SPINAL RESPONSE TO IMPACT
David Orne (Ph.D. Thesis) 1969 123 p
Avail: Univ. Microfilms: HC $6.00/Microfilm $3.00 Order No. 70-4163

A discrete-parameter model of the human body under a variety of impact situations was developed, emphasizing the spine as the main load-carrying element. The model simultaneously accounts for axial, shear and bending deformations of the discs; the viscoelastic behavior of the discs, the variable size of the vertebrae and discs, the natural curved shape of the spine, and the eccentric inertial loading caused by the head and trunk. The loading is a trapezoidal acceleration pulse applied via pelvis, at a general angle in the sagittal plane. The vertebrae and the intervertebral discs are simulated by a sysem of alternately rigid and deformable segments arranged to describe the natural curvature of the spine. Distributed body masses are attributed to the rigid segments, each of which has three degrees of freedom in the sagittal plane. A digital computer program, using a Runge–Kutta integration algorithm, was used for the solution. The model is potentially a useful tool for the prediction and control of spinal injuries produced under various impact situations. Dissert. Abstr.

N71-12286# Istituto di Fisica dell'Atmosfera, Rome (Italy).
ON A FEW MODIFICATIONS OF THE AIR CHARACTERISTICS DUE TO AID CONDITIONING INSTALLATIONS [STUDIO SU UPCUNE CARATTERISTICHE FISICHE DELL' ARIA IN UN AMBIENTE CONDIZIONATO]
Giuseppe Dalu Apr. 1969 33 p refs In ITALIAN
(IFA-SR-26) Avail: NTIS

The influence of air conditioning systems on personnel was analyzed and an explanation of ill-health sensations was sought. Oxygen concentration, air temperature, humidity, illumination, ion concentration, electric conductivity and condensation nuclei measurements were made but no conclusions were reached. ESRC

N71-12287# Human Engineering Labs., Aberdeen Proving Ground, Md.
ANCHORING LINES AND THE MUELLER-LYER ILLUSION
Lloyd L. Avant and Mike Kent Jul. 1970 13 p refs
(AD-712981; HEL-TN-6-70) Avail: NTIS CSCL 6/16

Using the method of pair comparisons, subjects judged 12 stimulus configurations comprised of horizontal Mueller-Lyer (M-L) figures bordered above and below by shorter or longer anchoring lines. From the pooling model of adaptation-level theory, it was predicted that perceived length of the M-L figures would be assimilated toward anchor length. Results confirmed the prediction. Author (TAB)

N71-12288# Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.
PHYSIOLOGICAL EVALUATIONS OF ARTIFICIAL SPACECRAFT ATMOSPHERES
Edwin Hendler 1970 21 p refs
(AD-712559) Avail: NTIS CSCL 6/19

The results of physiological evaluations of artificial spacecraft atmospheres carried out over an eight year period are summarized. The atmospheres studied include those consisting of pure oxygen and mixed gas (oxygen-nitrogen); additional factors evaluated include simulated launch and reentry accelerations, decompression, and exercise. Findings regarding changes in pulmonary function and incidence of decompression sickness are discussed in term of exposurg duration, sequence of applied stresses, and objective and subjective responses. The importance of individual reactions to imposed stresses is pointed out by particular examples, and the relations of such reactions to formulating judgments on the suitability of specific atmospheres are discussed. Author (TAB)

N71-12289# Human Engineering Labs., Aberdeen Proving Ground, Md.
ANCHORING STIMULI AND TITCHENER'S ILLUSION
Kathleen Wagner (Iowa State Univ.) and Lloyd L. Avant (Iowa State Univ.) Jul. 1970 10 p ref
(AD-712982; TN-7-70) Avail: NTIS CSCL 6/16

In a series of Titchener illusion figures, control subjects were asked to report the larger - center or surrounding - circles when the ratio of surrounding to center circle diameter varied, in .05 steps, from .75 to 1.25 across series members. Experimental subjects judged these series members, alternated with a stimulus configuration, in which the ratio of diameters was either .20 or 1.80. In both experimental groups, shifts in center-surrounding circle PSE and changes in judgments of series members were consistent with predictions drawn from the pooling model of AL theory. Author (TAB)

N71-12290# Advisory Group for Aerospace Research and Development, Paris (France).
AGARD SPECIALIST'S MEETING ON BLOOD CIRCULATION AND RESPIRATORY FLOW
J. F. Gross and K. Gersten Dec. 1970 16 p refs Conf. held at Naples, 4 – 6 May 1970
(AGARD-AR-30-70) Avail: NTIS

The purpose, scope, and results of an interdisciplinary meeting dealing with sciences in the field of fluid mechanics and in medicine are reviewed. The review shows a need for engineers and physicists to coordinate their efforts in fluid mechaics research. New insights are given for the behavior of all fluids in living systems. Author

N71-12291# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
NATIONAL ESTIMATE OF PUBLIC AND INDUSTRIAL HEAT REJECTION REQUIREMENTS BY DECADES THROUGH THE YEAR 2000 AD
R. T. Jaske, J. F. Fletcher, and K. R. Wise Feb. 1970 23 p refs Presented at the 67th Natl. Meeting of the Am. Inst. of Chem. Engr., Atlanta, 17 Feb. 1970 *Its* AIChE Paper No. 37A
(Contract AT(45-1)-1830
(BNWL-SA-3052; CONF-700212-1) Avail: NTIS

Reduction of heat emission into the atmosphere is discussed. Trends in plant thermal efficiency for the present and the future are also examined. A national energy policy is proposed using tax incentives for the elimination of disposable containers, internal combustion engine, uninsulated structures, incineration of wastes and nonregenerative air conditioning systems. J.A.M.

N71-12292# Human Engineering Labs., Aberdeen Proving Ground, Md.
COLOR AND SUBJECTIVE DISTANCE
Claude N. McCain, Jr. and A. Charles Karr Aug. 1970 16 p refs
(AD-712984; HEL-TM-20-70) Avail: NTIS CSCL 6/16

Sixteen observers adjusted the position of white or colored rod until it seemed to be alongside a reference white or colored rod. The colors used were blue and red of matched luminances. Observers tended to see the red rods as nearer and the blue rods as further away. It was concluded that red and blue are used as cues for depth perception. Author (TAB)

N71-12293# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.
SOME ACUTE AND CHRONIC EFFECTS OF ENDRIN ON THE BRAIN
Alvin M. Revzin Jul. 1970 14 p refs
(FAA-AM-70-11) Avail: NTIS

The data presented suggest that aerial applicator personnel exposed to endrin may be subject to two hitherto undefined toxic risks: (1) sensory disturbances which may appear after acute exposure at doses too low to produce tremors and other gross signs of poisoning; and (2) under some circumstances, endrin stored in body fat may be released in amounts sufficient to cause poisoning. The effects of endrin on the brain were determined in anesthetized pigeons and in nonanesthetized squirrel monkeys with chronically implanted electrodes. Author

N71-12294*# Mayo Association, Rochester, Minn.
STUDIES OF THE EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS Semiannual Status Report
1 Oct. 1970 41 p refs
(Grant NGR-24-003-001)
(NASA-CR-111606) Avail: NTIS CSCL 06S

The reproducibility and accuracy of the biplane roentgen videometry system developed for dynamic (60 per second) measurements of the shape and volume of the left ventricle in intact animals and man are discussed. The effects of the magnitude and duration of the gravitational-inertial force environment on intrathoracic pressure relationships and the consequent alterations in the spatial distribution of pulmonary blood flow are considered. The effects of water immersion and breathing liquid fluorocarbon on the cardiopulmonary effects of acceleration are investigated. Author

N71-12295*# California Univ., San Diego.
[MICRODOSIMETRY AND RADIOLOGY] Annual Report, 1 Oct. 1969 30 Sep. 1970
Norman A. Baily 30 Sep. 1970 69 p refs
(Grant NGL-05-009-103)
(NASA-CR-111820) Avail: NTIS CSCL 06R

Research progress is reported on the distribution in size of the energy depositions representing single events in volumes of biological significance when high energy charged particles cross such a volume and the spatial distribution of the secondary particles released by such events. Theoretical approaches to microdosimetry, radiobiology, and a single scan television system are also discussed. R.B.

N71-12296*# Houston Univ., Tex.
DEVELOPMENT OF LUNAR RECEIVING LABORATORY BIOLOGICAL PROTOCOL Final Report, 1 Jul. 1968 31 Aug. 1970
S. Venketeswaran 30 Oct. 1970 82 p refs
(Contract NAS9-8264)
(NASA-CR-108764) Avail: NTIS CSCL 06C

Selection of specific algae, seeds, and seedlings of higher plants and establishment of tissue cultures of plants of economic importance are discussed. The supplying of 40 to 50 tissue culture media of each of 8 representative plants and the same number of initial tissues of each of the 8 species is reported. Author

N71-12297# RAND Corp., Santa Monica, Calif.
FIFTY ENVIRONMENTAL PROBLEMS OF TIMELY IMPORTANCE
L. M. Libby Sep. 1970 70 p refs
(AD-712722; D-4415) Avail: NTIS CSCL 13/2

The paper surveys some of the most recognizable and pressing problems of the environment, and includes comments on them from the current literature. Topics include short articles on pollution involving SST and stratospheric air force planes, Heat, DDT, Airports, Design of satellite-city systems, Respiratory diseases and smog, Radioactive waste disposal methods, Constructive use of garbage, Indemnity payments by air polluters, Phosphorus in waste waters, Constructive use of sewage, Biologic effects of lead, Clean-up of fuel oil, Weather modification, Ocean pollution, Reuse of golf courses, graveyards, and railroad properties, City slums, Resources of continental shelves, Hot pipeline in arctic, Los Angeles and earthquakes, Weather and CO2, Dome over manhattan, Extermination genus rattus, Helium, Eutrophication, Law for pollution control, Atmospheric CO, Starfish and its control, Oil spills, Logging, Tundra lands, and Ice fog. TAB

N71-12298# Union Carbide Corp., Oak Ridge, Tenn. Nuclear Div.
BIOHAZARDS MANUAL
T. A. Lincoln, N. E. Bolton, A. C. Upton, R. W. Tennant, E. F. Babelay, et al May 1970 19 p refs
(Contract W-7405-eng-26)
(ORNL-TM-2854) Avail: NTIS

The problems of laboratory-acquired infections, oncogenic viruses, allergy to animal dander and sera, and carcinogens are reviewed. A classification of infectious agents is presented, with recommendations for their containment. A few basic principles for the safe handling of hazardous agents are listed, since accidents are more likely to occur with untrained or inexperienced personnel. The containment criteria specified were established to assure safety in laboratories engaged in biological research. Author

N71-12299# Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
HYDRODYNAMICS OF VISCOUS INTERNAL FLOWS WITH EMBEDDED PARTICULATE MATTER Final Report, 1967 – 1970
Richard Skalak Sep. 1970 5 p refs
(Contract N00014-67-A-0180-0003)
(AD-711818) Avail: NTIS CSCL 20/4

A review is given of principal technical accomplishments, along with a list of research personnel and publications. TAB

N71-12300# Stanford Univ., Calif.
[ON DETECTION OF ANTIGENS AND GENETIC ANALYSIS WITH MAN-MOUSE HYBRIDS] Progress Report
1970 54 p refs
(Contract AT(04-3)-326)

(SU-326-P-26-X-2) Avail: NTIS

Analysis of hybrids produced from a cross between human white cells and a 5BUdR resistant 3T3 cell line has provided convincing evidence for a new human autosomal linkage, namely between LDH B and Peptidase B. The products of this hybrid were assayed for 13 enzymes for which the human and mouse forms differ electrophoretically. Pairwise analysis of the association of these enzymes amongst the clonal products of the hybridization showed that the human forms of LDH B and Peptidase B were always either present together or absent together. This consistent association was confirmed in subclones of the lines derived from the initial colonies picked after hybridization. The human cell donor used in this cross was heterozygous for a peptidase D variant. This allowed the detection of segregation of the two homologous chromosomes carrying this gene into the hybrids. Thus one hybrid was found which expressed only one of the two peptidase D alleles and another was found expressing only the other allele. Statistical analysis of the results of this hybridization has provided further evidence for selection taking place during the evolution of hybrid colonies following the initial hybridization. Author (NSA)

N71-12301*# Techtran Corp., Glen Burnie, Md.
THE FUNCTIONAL SYNCHRONIZATION OF THE NEUROSECRETORY CELLS OF THE SUPRA-OPTICAL NUCLEUS OF THE DEHYDRATED AND REHYDRATED RAT: ULTRASTRUCTURAL STUDY [LA SYNCHRONIZATION FONCTIONNELLE DES CELLULES NEUROSECRETRICES DU NOYAU SUPRA-OPTIQUE DU RAT DESHYDRATE ET REHYDRATE, ETUDE ULTRASTRUCTURALE]
D. Picard Washington NASA Dec. 1970 8 p refs Transl. into ENGLISH from Compt. Rend., Ser. D (France), v. 271, no. 10, 7 Sep. 1970 p 847-850
(Contract NASw-2037)
(NASA-TT-F-13419) Avail: NTIS CSCL 06A

The presence of cells with different aspects in a single neurosecretory nucleus has been observed after the use of several optical microscopy techniques. There are two schools of thought as to the explanation for this phenomenon. The first claims that there are two categories of cells which have different hormonogenic functions. The second believes that this difference in aspect merely means that the cells being viewed constitute different stages in a cyclic secretory process. An experiment conducted on rats, involving their dehydration and rehydration with subsequent examination of the supra-optical nucleus is reported. Although it was not determined which of these theories is correct, certain basic information was generated which can be used by proponents of both theories. Author

N71-12302*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.
BIOPHYSICAL EVALUATION OF THE HUMAN VESTIBULAR SYSTEM Status Report, Jul. 1969 - Sep. 1970
J. L. Meiry and L. R. Young Sep. 1970 59 p refs
(Grant NGR-22-009-156)
(NASA-CR-111607; MV-70-5) Avail: NTIS CSCL 06P

Research on the function and importance of the vestibular system is reported. Research efforts fall under the following broad categories: (1) quantitative modelling of vestibular function including interaction with the visual system; (2) the underlying physiological and neurophysiological mechanisms responsible for observed vestibular and visual responses; and (3) clinical diagnosis of disorders based on the research of vestibular function. Author

N71-12303*# National Aeronautics and Space Administration. Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SEPTEMBER 1970
Oct. 1970 126 p refs
(NASA-SP-7011(81)) Avail: NTIS CSCL 06S

Subject coverage concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Each entry consists of a standard citation accompanied by its abstract. Author

N71-12304# Arizona Univ., Tucson. Dept. of Watershed Management.
STATISTICAL STUDY OF BASIC ECOLOGICAL VARIATIONS IN A SHORTGRASS SITE Technical Progress Report, 15 Sep. 1969 - 14 Sep. 1970
Charles D. Bonham 14 Sep. 1970 26 p refs
(Contract AT(11-1)-1821)
(COO-1821-2) Avail: NTIS

A study of statistical variations of ecological variables in a shortgrass site was performed in order to define important ecological variables and their variation on a geographical coordinate basis. Well-known statistical experimental designs have been useful in assessing ecological variation across a geographical surface. However, a computer mapping technique has been developed which gives more flexibility in interpretation of ecological variations across this surface. NASA

N71-12305# School of Aerospace Medicine, Brooks AFB, Tex.
COMBINED EFFECTS OF CHLORPROMAZINE AND ALTITUDE UPON PERFORMANCE IN THE RAT Technical Report, Jan. - Mar. 1970
Charles E. Dasher and Horace E. Hamilton Aug. 1970 17 p refs
(AD-712664; SAM-TR-70-46) Avail: NTIS CSCL 6/15

Four male Sprague-Dawley rats were conditioned to press a lever in response to visual and auditory cues, and to release the lever upon termination of the cues. The rodents were then tested under the conditions of saline, chlorpromazine (CPZ), altitude, and CPZ plus altitude. For each set of data, 50 trials of control data were recorded, and then the animals were either injected with saline or CPZ, or, in the case of controls, merely stuck with a needle. Twenty-five minutes after injection, an additional 50 trials were recorded. For the altitude data, the rodents were brought to the simulated altitude 5 minutes after injection. Performance was significantly decreased by CPZ ($P < .01$) and by altitude ($P < .05$), but no CPZ-altitude interactions were observed. Saline produced no effect upon performance. Author (TAB)

N71-12306# Federation of Rocky Mountain States, Inc., Denver, Colo.
PROCEEDINGS OF WESTERN STATES CONFERENCE ON SCIENCE AND TECHNOLOGY AND ITS APPLICATION TO THE PROBLEMS OF POLLUTION, TRANSPORTATION AND EMPLOYMENT
Mar. 1970 147 p refs Held at Salt Lake City, 9-11 Mar. 1970
Sponsored by NSF
(PB-192329) Avail: NTIS CSCL 13B

Panel topics were: (1) science, technology, and human resources; and (2) planning science for what can be done in the future. USGRDR

N71-12307# Naval Intelligence Command, Alexandria, Va. Translation Div.

CHANGE OF MUSCULAR WORKING CAPACITY AFTER EXPOSURE OF MAN TO HYPOKINETIC CONDITIONS [IZMENENIE MYSHECHNOI RABOTOSPOSOBNOSTI POSLE PREBYVANIYA CHELOBEKA V USLOVIYAKH GIPOKINEZII]

N. I. Taranov et al. 12 Oct. 1970 9 p Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 51, no. 11, 1965 p 1351-1355
(AD-713007; NIC-Trans-3124) Avail: NTIS CSCL 6/19

During extended flights under conditions of weightlessness muscular activity will be sharply decreased as a result of reduced exertions related with maintenance and change of posture. Apparently, the capacity of man to carry out work related with physical exertion undergoes a significant change under these circumstances. Research has shown that prolonged exposure of man to decreased mobility leads to a decline in his capacity to carry out work related to the use of static exertion. The task of this work included the study of changes in the capacity of man to carry out rhythmic work in manually lifting a weight after exposure to reduced mobility and minimal muscular exertion in maintaining posture. Author (TAB)

N71-12308# Akademiya Nauk URSR, Kiev.

SOME RESULTS OF PHYSIOLOGICAL INVESTIGATIONS DURING THE FLIGHT OF THE 'SOYUZ'-9 SPACECRAFT

O. G. Gazenko and P. V. Vasilyev Oct. 1970 5 p Presented at the 21st Intern. Astronaut. Congr., Constance, W. Ger., 4-10 Oct. 1970
Avail: NTIS

Significant findings are presented concerning the space flight effects on the crew of Soyuz-9 examinations made both during and after the flight. During the flight the cardiovascular and repiration function, energy expenditures, the state of the central nervous system, and analyzers were assessed. Variations in work performance were examined on the basis of the results of working operations and specific tests. Three times during the 18 days the diurnal urine was sampled for analysis. Post-flight examinations ascertained the changes in body weight, bone density, blood viscosity, protein content in the blood serum, and the albumin-globulin coefficient. The results indicate the man can survive an 18-day space flight and retain mental and physical performance. The findings also suggest that the entire cycle of adaptation-readaptation to the space-earth environments places certain demands on the human body and that readaptation is a more difficult process. D.L.G.

N71-12309# Joint Publications Research Service, Washington, D.C.

ECHOLOCATION IN NATURE

E. Sh. Ayrapet Yants et al. 6 Oct. 1970 42 p refs Transl. into ENGLISH from the book "Ekholokatsiya v Prirode" Nauka Publishing House; 1970 p 323 338, 344 358
(JPRS-51511) Avail: NTIS

Soviet experiments on the echolocation capabilities of dolphins are discussed. These experiments were designed to provide additional information on the capability of dolphins to distinguish objects, such as fish and rubber pipes, of various sizes. Results indicate that dolphins are capable, by perceiving the refiected signals, of recognizing objects according to size and according to the quality of the reflecting surface. A.L.

N71-12310# National Inst. of Radiological Sciences, Chiba (Japan).

[RADIOLOGICAL SCIENCE: PHYSICAL, MEDICAL, BIOLOGICAL, AND ENVIRONMENTAL STUDIES] Annual Report, 1968 1969

Oct. 1969 85 p refs
(NIRS-8) Avail: AEC Depository Libraries

Radiological science research is reported in four sections and includes: (1) The development of radiation detectors and dosimeters for nuclear medicine and radiation protection is summarized. (2) Brief papers or abstracts are presented for seven medical research projects. (3) Biological investigations reported include research in the areas of biochemistry, biophysics, cytology, genetics, morphology, and physiology. (4) Brief papers or abstracts are presented for five environmental research projects. D.L.G.

N71-12311# Oak Ridge National Lab., Tenn. Ecological Sciences Div.

RELATIONSHIP OF CESIUM 137 AND IRON 59 ELIMINATION RATES OF SMALL RODENTS

C. E. Baker (Ph.D. Thesis Tennessee Univ.), P. B. Dunaway, and S. I. Auerbach Jul. 1970 113 p refs
(Contract W-7405-eng-26)
(ORNL-4568; UC-48) Avail: NTIS

Elimination of Cs-137 and Fe-59 by wild rodents was measured in the laboratory and field to determine whether excretion rates of these nuclides are influenced directly by general metabolic rates. The object of this research was to establish a technique for measuring metabolism in the field for ultimate application in energy flow studies. A double-tagging method was employed, isotopes were administered intraperitoneally, and attention was focused on final-component elimination of each isotope. Long-component intercept values of Cs-137, which indicated the level of incorporation or rate of initial-component excretion, exhibited a strong correlation with CO2 production within species. Based on this relationship, equations were derived to predict metabolism from Y-axis intercept values. These equations have potential use in estimating metabolism of rodents in the field for energy flow measurements. Although Fe-59 elimination appeared to correlate with metabolic rates in the field, laboratory experiments failed to demonstrate a predictable relationship between excretion of this nuclide and general metabolism. Author

N71-12312*# California Univ., Berkeley. Space Sciences Lab.

STUDY OF GROWTH IN RECENT AND FOSSIL INVERTEBRATE EXOSKELETONS AND ITS RELATIONSHIP TO TIDAL CYCLES IN THE EARTH-MOON SYSTEM Semiannual Report, Apr. - Sep. 1970

William B. N. Berry Sep. 1970 9 p refs *Its* Space Sci. Lab. Ser. 11, Issue No. 78
(Grant NGR-05-003-067)
(NASA-CR-111608) Avail: NTIS CSCL 06C

Data obtained from demonstrated and apparent growth rhythms observed in shells of fossil marine invertebrate animals are discussed with respect to their use in calculating the possible relationship of the earth and moon through prehistoric time and in postulating the possible origins of the earth-moon system. Previous authors suggested that certain fine growth increments that may be observed clustered within the major, annually formed bands reflect environmental rhythmic changes such as tides and water temperature changes coincident with the seasons. The fine growth increments and clusters of them within the annually formed bands were investigated to find the relationship of such increments to environmental phenomena. An attempt is made to relate the features of the shells seen in living animals to similar features in the shells of fossils. Author

N71-12313*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.

MECHANISMS FOR THE EFFECT OF ELECTRIC AND MAGNETIC FIELDS ON BIOLOGICAL SYSTEMS Final Report, Jun. 1967 Sep. 1970

M. M. Labes Sep. 1970 83 p refs
(Grant NGL-39-004-015)
(NASA-CR-111582) Avail: NTIS CSCL 06A

CONTENTS:

1. INFLUENCE OF ELECTRIC FIELDS ON THE RATE OF GROWTH OF MOLECULAR SOLIDS A. Szymanski and M. M. Labes 3 p refs (See N71-12314 03-04)

2. CONDUCTIVITY IN LIQUID CRYSTALS S. Kusabayashi and M. M. Labes 11 p refs (See N71-12315 03-04)

3. RELATIONSHIP BETWEEN ELECTRIC FIELD STRENGTH AND HELIX PITCH IN INDUCED CHOLESTERIC-NEMATIC PHASE TRANSITIONS H. Baessler and M. M. Labes 3 p refs (See N71-12316 03-04)

4. ELECTRIC FIELD EFFECTS ON THE DIELECTRIC PROPERTIES AND MOLECULAR ARRANGEMENTS OF CHOLESTERIC LIQUID CRYSTALS H. Baessler and M. M. Labes 7 p refs (See N71-12317 03-04)

5. ELECTRIC FIELD EFFECTS ON THE OPTICAL ROTATORY POWER OF A COMPENSATED CHOLESTERIC LIQUID CRYSTAL H. Baessler, T. M. Laronge, and M. M. Labes 8 p refs (See N71-12318 03-04)

6. ALTERNATING-CURRENT-FIELD INDUCED CHOLESTERIC-NEMATIC PHASE TRANSITIONS H. Baessler and M. M. Labes 4 p refs (See N71-12319 03-04)

7. DIPOLE RELAXATION IN A LIQUID CRYSTAL H. Baessler, R. R. Beard, and M. M. Labes 7 p refs (See N71-12320 03-04)

8. MAGNETIC-FIELD EFFECTS ON A COMPENSATED CHOLESTERIC LIQUID CRYSTAL T. H. Laronge, H. Baessler, and M. M. Labes 3 p refs (See N71-12321 03-04)

9. THE ABSENCE OF HELICAL INVERSION IN SINGLE COMPONENT CHOLESTERIC LIQUID CRYSTALS H. Baessler, P. A. G. Malya, W. R. Nes, and M. M. Labes 10 p refs (See N71-12322 03-04)

10. HELICAL TWISTING POWER OF STEROIDAL SOLUTES IN CHOLESTERIC MESOPHASES H. Baessler and M. M. Labes 7 p refs (See N71-12323 03-04)

11. DETERMINATION OF THE PITCH OF A CHOLESTERIC LIQUID CRYSTAL BY INFRARED TRANSMISSION MEASUREMENTS H. Baessler and M. M. Labes 3 p refs (See N71-12324 03-04)

N71-12314*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
INFLUENCE OF ELECTRIC FIELDS ON THE RATE OF GROWTH OF MOLECULAR SOLIDS
A. Szymanski and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems, Sep. 1970 3 p Repr. from Nature (London), v. 220, no. 5163, 12 Oct. 1968 p 159 - 161 refs (See N71-12313 03-04)
(A69-10140) Avail: NTIS CSCL 06A

Growth rates of insulating crystals were examined in the melt, solution and vapor phases and evidence was obtained that the rate of growth of an organic solid from the vapor phase can be controlled by applying a dc electric field to the growing surface. At low growth rates (0.2 micrograms/min), by applying an electric field of the order of 4,000 V/cm, it is in fact possible to prevent crystal growth. The experiments were conducted by continuous vacuum evaporation of aromatic hydrocarbons from a Knudsen cell at pressures of 5 × 0.00001 atmospheres or less with a crystal mounted on a stirrup of a Cahn RG electro-balance. Author

N71-12315*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
CONDUCTIVITY IN LIQUID CRYSTALS
S. Kusabayashi and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 11 p Repr. from Mol. Cryst. and Liquid Cryst. (Engl.), v. 7, 1969 p 395 - 405 refs (See N71-12313 03-04)
Copyright. Avail: NTIS CSCL 06A

Dark and photoconductivities of nematic, smectic and cholesteric materials were measured with particular attention to the changes in properties at phase transitions. Although a reasonably large photoresponse could be found in several liquid crystals at room temperature only a very small photoresponse occurred in the liquid crystal state. At the transition point solid yields liquid crystal the dark conductivity, sigma sub D, and the thermal activation energy, E sub a typically show large changes, while in the liquid crystal yields liquid transition sigma sub D and E sub a change only slightly. Both transition temperatures can easily be identified in the plots of log sigma vs 1/T, and agree well with microscopic and calorimetric observations. Cholesteric materials show a surprising decrease in dark conductivity at the solid yields cholesteric transition during heating, in contrast with the behavior of nematic and smectic materials. Author

N71-12316*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
RELATIONSHIP BETWEEN ELECTRIC FIELD STRENGTH AND HELIX PITCH IN INDUCED CHOLESTERIC-NEMATIC PHASE TRANSITIONS
H. Baessler and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 3 p Repr. from Phys. Rev. Lett., v. 21, no. 27, 30 Dec. 1968 p 1791 - 1793 refs (See N71-12313 03-04)
(A69-14964) Avail: NTIS CSCL 06A

A cholesteric-nematic phase transition can be induced by relatively weak electric fields, and the threshold field varies inversely with the pitch of the helix in corroboration of recent theoretical suggestions. The phase change is accompanied by a change in the activation energy for charge-carrier production and can easily be observed by both conductivity measurements and direct optical examination. Author

N71-12317*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
ELECTRIC FIELD EFFECTS ON THE DIELECTRIC PROPERTIES AND MOLECULAR ARRANGEMENTS OF CHOLESTERIC LIQUID CRYSTALS
H. Baessler and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 7 p Repr. from J. of Chem. Phys., v. 51, no. 5 1 Sep. 1969 p 1846 - 1852 refs (See N71-12313 03-04)
(A70-11352) Avail: NTIS CSCL 06A

Measurements of dielectric constants of a cholesteryl chloride - cholesteryl myristate mixture having a strongly temperature-dependent helical pitch were performed in the presence and absence of an applied dc electric field. An analysis of the molecular arrangement in samples oriented by wall effects is presented, as well as the perturbations in this arrangement which occur both thermally and by the application of an electric field. Elastic moduli of bending and torsional strain are estimated from the threshold electric fields observed to (1) induce helical perturbation and (2) destroy the helical structure in the transition to a nematic phase. Author

N71-12318*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
ELECTRIC FIELD EFFECTS ON THE OPTICAL ROTATORY POWER OF A COMPENSATED CHOLESTERIC LIQUID CRYSTAL
H. Baessler, Thomas M. Laronge, and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 8 p Repr. from J. of Chem. Phys., v. 51, no. 8, 15 Oct. 1969 p 3213 - 3219 refs (See N71-12313 03-04)
(A70-14003) Avail: NTIS CSCL 06A

By studying the optical rotatory power (OR) of a compensated cholesteric helical structure, it is possible to observe both thermally

induced helical inversion and electric field perturbations of the helix. For a cholesteryl chloride - cholesteryl myristate 1.75:1 mixture, the OR changes sign at T = T(nematic) = 42 deg increasing to infinity prior to the inversion. Upon application of a dc electric field parallel to the helix axis, the OR decreases continuously and reversibly by a factor of 4 in the field range 0.25 F sub u <F <F sub u, where F sub u denotes the critical field required to induce a nematic transition. This effect cannot be explained as a macroscopic reordering of the material, but is rather due to a decrease in pitch accompanying a conical helical perturbation. This perturbation arises from bending forces tending to align the dipole moments of cholesteryl chloride in the field direction. When a dc field is applied perpendicular to the helix axis, the pitch diverges logarithmically to infinity as F approaches the critical value for inducing a transition. Author

N71-12319*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
ALTERNATING-CURRENT-FIELD INDUCED CHOLESTERIC-NEMATIC PHASE TRANSITIONS
H. Baessler and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 4 p Repr. from J. of Chem. Phys., v. 51, no. 12, 15 Dec. 1969 p 5397-5400 refs (See N71-12313 03-04)
(A70-20053) Avail: NTIS CSCL 06A

In order to determine whether interaction between the permanent or the induced molecular dipole moments of a cholesteric liquid crystal and an applied electric field is responsible for inducing a transition to a nematic phase, ac-field measurements were performed. In a mixture of cholesteryl chloride and cholesteryl myristate, phase transitions can be induced by an ac field of a frequency up to a threshold value which is approximately equal to the relaxation frequency for rotation of cholesteryl chloride molecules around a short molecular axis which has recently been determined by dielectric measurements. A relation between the rms field and the threshold value is derived and experimentally verified. The absence of ferroelectric ordering in the induced and aligned nematic phase is demonstrated. Author

N71-12320*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
DIPOLE RELAXATION IN A LIQUID CRYSTAL
H. Baessler, R. R. Beard, and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 7 p Repr. from J. of Chem. Phys., v. 52, no. 5, 1 Mar. 1970 refs (See N71-12313 03-04)
(A70-26859) Avail: NTIS CSCL 06A

The real and imaginary parts of the dielectric constant of a 1.75:1.00 mixture of cholesteryl chloride and cholesteryl myristate were measured in the frequency range 1 kHz to 10 MHz. Two modes of molecular rotation are found to contribute to dipole relaxation: rotation of cholesteryl chloride around a short molecular axis (process R sub 1), and rotation of cholesteryl myristate around a long molecular axis (R sub 2). The relaxation frequency associated with R sub 1 changes by not more than a factor of 2 when going from the cholesteric phase to the isotropic melt or to a field-induced aligned nematic phase. This indicates that the potential barrier hindering molecular rotation is determined by short-range order rather than long-range order. From the magnitude of the dielectric increment, conclusions are drawn regarding the molecular arrangement in the various phases. The temperature dependence of the relaxation frequency is analyzed in terms of absolute rate theory. Author

N71-12321*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
MAGNETIC-FIELD EFFECTS ON A COMPENSATED CHOLESTERIC LIQUID CRYSTAL
Thomas H. Laronge, H. Baessler, and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 3 p Repr. from J. of Chem. Phys., v. 51, no. 10, 15 Nov. 1969 p 4186-4188 refs (See N71-12313 03-04)
(A70-17326) Avail: NTIS CSCL 06A

By measuring changes in the dielectric constant of a 1.75:1 cholesteryl chloride-cholesteryl myristate (CM) mixture in the presence of magnetic fields H up to 10 kG, the orientation of the molecular and helical axes with respect to the field direction can be deduced, and the possibility of a dependence of the alignment process on the pitch Z of the helix is explored. A comparison is also made of the effects of electric and magnetic fields on CM; an electric field of 500 V/cm counteracts a magnetic field of the order of 10 kG. The anisotropy of the diamagnetic susceptibility is deduced to be approximately 10 to the 9th power. Author

N71-12322*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry and Biological Sciences.
THE ABSENCE OF HELICAL INVERSION IN SINGLE COMPONENT CHOLESTERIC LIQUID CRYSTALS
H. Baessler, P. A. G. Malya, W. R. Nes, and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 10 p Repr. from Mol. Cryst. and Liquid Cryst. (Engl.), v. 6, 1970 p 329-338 refs (See N71-12313 03-04)
(Grant NIH AM-12172)
Copyright. Avail: NTIS CSCL 06A

Since a thermally induced helical inversion has been observed in cholesteryl 2-(2 ethoxyethoxy) ethyl carbonate (CEC), it has been the view that compensation of the helical structure of cholesteric liquid crystals does not require the presence of two compounds which separately form a right and a left handed helix. The present investigation demonstrates that the material used in the previous investigation was probably a compensated mixture because it contained an impurity in a rather high concentration. Pure CEC forms a right handed helix with a pitch of 6000 A at room temperature, and with no indication of a thermally induced helical inversion. It is further shown that in general the sense of the helical screw is not necessarily identical with the sign of the optical rotation of the constituent molecules. Author

N71-12323*# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
HELICAL TWISTING POWER OF STEROIDAL SOLUTES IN CHOLESTERIC MESOPHASES
H. Baessler and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 7 p Repr. from J. of Chem. Phys., v. 52, no. 2, 15 Jan. 1970 p 631-637 refs (See N71-12313 03-04)
(A70-21524) Avail: NTIS CSCL 06A

Shifts in the nematic temperature of a compensated cholesteric liquid-crystal solvent, consisting of cholesteryl chloride and cholesteryl myristate, are caused by adding steroidal solutes. A helical twisting power P can be defined which is a molecular property; there is a linear dependence of the inverse of the solute concentration on the helical pitch. The method has the advantages of (1) allowing study of compounds which do not form mesophases themselves and (2) eliminating temperature effects. For a series of fatty acid esters of cholesterol, P decreases with decreasing number of carbon atoms in the ester chain, and shows a zigzag fine structure with P having higher values for odd-numbered carbon-atom chains. P, and therefore the helix, changes rotational senses if the ester chain is replaced by Cl, Br, or OH. Changes are also discussed associated with modification of the 17 side chain or the steroid ring system itself. A model is proposed attributing P to the molecular asymmetry at the 3 beta position of the steroid ring, which can cause macroscopic twist if two lever arms are present, one of which lacks rotational symmetry. Author

N71-12324*# Drexel Univ., Pittsburgh, Pa. Dept. of Chemistry.
DETERMINATION OF THE PITCH OF A CHOLESTERIC

LIQUID CRYSTAL BY INFRARED TRANSMISSION MEASUREMENTS

H. Baessler and M. M. Labes *In its* Mech. for the Effect of Elec. and Magnetic Fields on Biol. Systems Sep. 1970 3 p Repr. from Mol. Cryst. and Liquid Cryst. (Engl.) v. 6, 1970 p 419-422 refs (See N71-12313 03-04)

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A simple method is presented for determining the pitch based on transmission measurements. It can be particularly valuable in the infrared, i.e. a pitch range of about 0.5 to 5 microns where reflectance measurements are difficult. Author

N71-12325*# Techtran Corp., Glen Burnie, Md.

CONSUMPTION OF O2 IN AN ISOLATED RAT INTESTINE DEPRIVED OF ADRENALS [IL CONSUMO DI O2 DELL'INTESTINO ISOLATO DI RATTO SURRENOPRIVO]

P. Pietra et al Washington NASA Dec. 1970 2 p Transl. into ENGLISH from Boll. Soc. Ital. Biol. Sper. (Italy), v. 44, 1968 p 152

(Contract NASw-2037)

(NASA-TT-F-13418) Avail: NTIS CSCL 06A

The results of adrenalectomy indicate increased oxygen consumption of rat intestines. Oxygen consumption is compared to body weight. Author

N71-12326*# California Univ., Berkeley. Dept. of Nutritional Sciences.

INVESTIGATION OF THE NUTRITIONAL PROPERTIES OF HYDROGENOMONAS EUTROPHA Final Report, 1 Nov. 1964 31 Dec. 1968

Doris Howes Calloway and Sheldon Margen 31 Dec. 1968 80 p refs

(Grant NGR-05-003-089)

(NASA-CR-111599) Avail: NTIS CSCL 06M

The nutritional properties and compositions of several lots of Hydrogenomonas eutropha cells were made under various conditions. Among the findings are the following: The protein is adequately digested. The absorbed protein is of good quality. Stored lipid is not digestible. For humans the amount of dietary preformed nucleic acids should be less than 8 g/day in a diet providing 75 g of protein. Bacteria might possibly serve as a sole source of protein for man. The maximum amount of bacteria included in the human diet is much less than 6 g. Papers are appended on protein quality and nutritional value of lipids in H. eutropha; uric acid production in man from dietary bacteria and the suppression of the uric acid; and human intolerance to bacteria. For individual titles, see N71-12327 through N71-12332. N.E.N.

N71-12327*# California Univ., Berkeley. Dept. of Nutrional Sciences.

PROTEIN QUALITY OF THE BACTERIUM HYDROGENOMONAS EUTROPHA

Doris Howes Calloway and Adarsh M. Kumar *In its* Invest. of the Nutritional Properties of Hydrogenomonas Eutropha 31 Dec. 1968 3 p refs Repr. from Appl. Microbiol., v. 17, no. 1, Jan. 1969 p 176-178 (See N71-12326 03-04)

(A69-23306) Copyright. Avail: NTIS CSCL 06M

Hydrogenomonas eutropha cells harvested from semicontinuous autotrophic culture and washed free of substrate contain about 13% of nitrogen on a dry-solids basis. Biological value and digestibility of the bacterial nitrogen were determined in the rat by use of an abbreviated Mitchell-Thomas nitrogen balance technique and casein as the standard protein. Casein nitrogen was 99% digestible, and that of both whole boiled and sonically ruptured bacterial cells was 93%. Biological value of casein and the bacterial preparations was uniformly 77%. Amino acid composition of the bacteria, as in the case of casein, indicates a first limitation of sulfur-containing amino acids. These compositional features suggest that H. eutropha may be potentially valuable as a protein supplement in animal feeds. Author

N71-12328*# California Univ., Berkeley. Dept. of Nutritional Sciences.

NUTRITIONAL VALUE OF LIPIDS IN HYDROGENOMONAS EUTROPHA AS MEASURED IN THE RAT

Carol I. Waslien and Doris Howes Calloway *In its* Invest. of the Nutritional Properties of Hydrogenomonas Eutropha 31 Dec. 1968 18 p refs Submitted for publication (See N71-12326 03-04)

Avail: NTIS CSCL 06M

Hydrogenomonas eutropha is known to accumulate lipid, comprised largely of polymerized beta hydroxybutyric acid, when maintained in nitrogen-deficient medium. This lipid was very poorly absorbed from bacterial diets by mice, even though nitrogen absorption was adequate. The monomer, free beta hydroxybutyric acid, was well absorbed from purified diet. Rats fed the monomer or butyric acid ate less food and grew more slowly than rats fed corn oil. Author

N71-12329*# California Univ., Berkeley. Dept. of Nutritional Sciences.

URIC ACID PRODUCTION OF MEN FED GRADED AMOUNTS OF EGG PROTEIN AND YEAST NUCLEIC ACID

Carol I. Waslien, Doris Howes Calloway, and Sheldon Margen *In its* Invest. of the Nutritional Properties of Hydrogenomonas Eutropha 31 Dec. 1968 6 p refs Repr. from Am. J. Clin. Nutr., v. 21, no. 9, ep. 1968 p 892-897 Pr en, d at the 52p Ann. Meeting of the Federation of Im Soc. for Exptl. Biol., Atlantic City, Apr. 1968 (See N71-12326 03-04)

(Grants NGR-05-003-068; NIH AM-10202)

(A69-15968) Avail: NTIS CSCL 06A

Healthy male subjects were fed purine-free basal diets containing 0-75 g of protein and, at the highest protein level, 0-8 g of added yeast ribonucleic acid in order to differentiate effects of these dietary components on plasma and urinary uric acid production. Urinary uric acid levels were significantly higher and plasma levels lower with 75 g of protein than with a protein-free diet. When nucleic acid was fed, plasma and urinary uric acid increased linearly in four of five subjects. Predictive equations were derived describing this response to dietary nucleic acid. Author

N71-12330*# California Univ., Berkeley. Dept. of Nutritional Sciences.

URIC ACID LEVELS IN MEN FED ALGAE AND YEAST AS PROTEIN SOURCES

Carol I. Waslien, Doris Howes Calloway, Sheldon Margen, and Francoise Costa *In its* Invest. of the Nutritional Properties of Hydrogenomonas Eutropha 31 Dec. 1968 80 p refs (See N71-12326 03-04)

Avail: NTIS CSCL 06A

Microorganisms grown on human or industrial waste may be economical, nutritious food sources. Algae (Chlorella sorokiniana) and yeast (Torulopsis utilis) were compared with casein at two nitrogen levels as sole sources of protein for men. Biological value of algal protein was superior to casein, but yeast protein was not quite as good as algae, in diets containing 25 g protein. When 50 g of algae protein was consumed, true nitrogen digestibility was reduced, but nitrogen balances indicated that 50 g of any of these proteins met or exceeded dietary requirements. Urinary uric acid increased considerably with algae and yeast. Renal clearances were not sufficient to prevent abnormally high plasma uric acid levels, comparable to those found in gout. Author

N71-12331*# California Univ., Berkeley. Dept. of Nutritional Sciences.

SUPPRESSION OF URIC ACID FORMATION FROM DIETARY NUCLEIC ACID WITH ALLOPURINOL

Jean Bowering, Sheldon Margen, Doris Howes Calloway, and April Rhyne *In its* Invest. of the Nutritional Properties of Hydrogenomonas Eutropha 31 Dec. 1968 9 p refs Submitted for publication (See N71-12326 03-04)

Avail: NTIS CSCL 06A

In a controlled human metabolic study, addition of 8 g/day of yeast RNA to a low-protein, purine-free formula diet produced elevated serum and urinary uric acid levels which could be reduced by allopurinol, an inhibitor of uric acid formation. Administration of 100 mg/day of allopurinol also led to a rise in urinary hypoxanthine plus xanthine which was less than the fall in urinary uric acid. Since total oxypurine excretion was reduced, it appears that allopurinol effectively suppresses both endogenous purine synthesis and synthesis of uric acid from exogenous purines. Author

N71-12332*# California Univ., Berkeley. Dept. of Nutritional Sciences.

HUMAN INTOLERANCE TO BACTERIA AS FOOD

Carol I. Waslien, Doris Howes Calloway, and Sheldon Margen *In its* Invest. of the Nutritional Properties of Hydrogenomonas Eutropha 31 Dec. 1968 4 p refs Repr. from Nature (London), v. 221, no. 5175, 4 Jan. 1969 p 84 85 Sponsored in part by NIH (See N71-12326 03-04)

(A69-27265) Avail: NTIS CSCL 06M

Lots of Hydrogenomonas eutropha, washed free of the culture medium, were prepared as food and fed to males. Severe symptoms were produced by autotrophically grown H. eutropha; less severe symptoms were produced by heterotrophically grown H. eutropha. A lot of Aerobacter aerogenes was also fed to the subjects and produced basically the same as the first lot of H. eutropha. Blood pressure and body temperature were not affected. N.E.N.

N71-12333*# General Dynamics/Convair, San Diego, Calif.

A CARBON DIOXIDE REDUCTION UNIT USING BOSCH REACTION AND EXPENDABLE CATALYST CARTRIDGES

R. F. Holmes, E. E. Keller, and C. D. King Washington NASA Nov. 1970 67 p refs

(Contract NAS1-8217)

(NASA-CR-1682; GDC-DBD70-001) Avail: NTIS CSCL 06K

The feasibility of producing an efficient and reliable flight-qualified carbon dioxide reduction unit for use in life support systems for long-duration and space missions has been demonstrated. A prototype reduction unit utilizing the Bosch catalytic reaction and expendable catalyst cartridges was developed. The unit has two reactors with replaceable catalyst cartridges, each reactor having process capacity for continuous reduction of the carbon dioxide which would be produced metabolically by a four-man crew. Reaction was easily alternated between the two reactors allowing cartridge replacement without process interruption. Reaction within the catalyst cartridge was readily initiated and maintained. No carbon migrated from the cartridge or was formed by reactions outside of the cartridge. Cartridge life was approximately three days and replacement was a simple and clean operation. Author

N71-12334*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

FIXED-BASE VISUAL-SIMULATION STUDY OF MANUALLY CONTROLLED OPERATION OF A LUNAR FLYING VEHICLE

G. Kimball Miller, Jr. and Gene W. Sparrow Washington Dec. 1970 42 p refs

(NASA-TN-D-5983; L-7320) Avail: NTIS CSCL 05H

A fixed-base visual-simulation study has been conducted to determine the instrumentation and control requirements for operating a lunar flying vehicle over a range of about 2.25 nautical miles (4.167 km). The study indicated that a rate-command attitude control system was required for small center-of-gravity offsets. The average characteristic velocity required to fly a 500-foot-altitude (152.4-m)-flat-top trajectory to the target was 1197.6 ft/sec (365.0 m/sec) with a standard deviation of 199.0 ft/sec (60.6 m/sec) when the instrumentation used included a three-axis gyro-horizon, a fuel indicator, a lunar thrust-weight-ratio indicator, and an altimeter. When horizontal- and vertical-velocity indicators were included, the average characteristic velocity was reduced by approximately 150 ft/sec (45.7 m/sec) and the standard deviation by 100 ft/sec (30.5 m/sec). It was extremely difficult to perform the maneuver without velocity indicators or an altimeter. Author

N71-12335* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

PRESSURE SUIT TIE-DOWN MECHANISM Patent

James H. O'Kane, inventor (to NASA) Issued 22 Nov. 1966 (Filed 7 Apr. 1964) 11 p Cl. 2-2.1

(NASA-Case-XMS-00784; US-Patent-3,286,274;

US-Patent-Appl-SN-358127) Avail: US Patent Office CSCL 06Q

A helmet and torso tiedown mechanism for pressure suits is described. The mechanism is positioned in the front of the suit and attached to it by cables fastened to opposite sides of a rigid neck ring of the suit on which the helmet is secured, or they may be attached to opposite sides of the helmet itself. The mechanism is also secured by flexible cords to one end of a crotch belt which is secured at its other end to the suit in the vicinity of the crotch or is passed under the crotch and attached to the back of the suit. The mechanism includes a pulley block assembly on which are mounted a pair of rollers or pulleys for supporting a pair of the cords, each of which is reeved over one of the pulleys and attached at its ends to the crotch belt. To shorten the suit, the two movable cords are grasped with both hands and pulled in the directions opposed to their directions of free movement to spread the cords in front of the chest. The cord pair is also provided with an elastic section which maintains the cord taut while permitting variation in its length. R.B.

N71-12336* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

HAND-HELD SELF-MANEUVERING UNIT Patent

Harold I. Johnson and William C. Huber, inventors (to NASA) Issued 6 Sep. 1966 (Filed 3 Dec. 1965) 8 p Cl. 244-4

(NASA-Case-XMS-05304; US-Patent-3,270,986;

US-Patent-Appl-SN-511567) Avail: US Patent Office CSCL 05H

A hand-held maneuvering unit is described which is capable of propulsion and attitude control of an astronaut in a zero or reduced gravity environment. The device consists of a propulsion unit utilizing the thrust developed by a pressurized gas escaping from various nozzles. The thrust is initiated by a rocking trigger mechanism designed to provide either forward or reverse movement of the operator. The fuel supply may be affixed to and carried by the trigger housing in a pair of tanks, or it may be carried in tanks removed from the unit. The unit contains compensated type poppet valves which are opened by trigger deflection and enable fuel flow proportionate to the magnitude of deflection. R.B

N71-12337# AAI Corp., Baltimore, Md.

ACCURATE AERIAL DELIVERY SYSTEM, PHASE 1 Summary Report

Walter L. Black, B. W. Jezek, J. S. Taylor, R. D. Mikesell, and E. A. Thomassen Sep. 1969 181 p refs

(Contract DOT-CG-93227-A)
(AD-712288; ER-5934) Avail: NTIS CSCL 6/7

The Coast Guard, as a part of their sea rescue mission, are frequently required to aid distressed boats by dropping from an airplane a package containing emergency pumping equipment. The boats usually are unable to maneuver, making it necessary to accomplish the drop in the near vicinity of the boat so that the package can be captured from the deck of the boat. Due to the precision required, plus the usual situation of unsettled weather conditions, delivery failures are common. A study was performed of delivery concepts, equipment, and techniques to determine if equipment and procedural changes could be devised that would significantly improve delivery success. Author (TAB)

N71-12338# AAI Corp., Baltimore, Md.
ACCURATE AERIAL DELIVERY SYSTEM, PHASE 2 Summary Report
Walter L. Black Nov. 1969 72 p
(Contract DOT-CG-93227-A)
(AD-712289; ER-6020) Avail: NTIS CSCL 6/7

The Coast Guard, as part of their sea rescue mission, are frequently required to aid distressed boats by dropping from an airplane a package containing emergency pumping equipment. Due to the precision required, plus the usual situation of unsettled weather conditions, delivery failures are fairly common. A study was performed of delivery concepts, equipment, and techniques to determine if equipment and procedural changes could be devised that would significantly improve delivery success. The report describes the equipment and delivery techniques that are recommended for this delivery system. Author (TAB)

N71-12339# Naval Postgraduate School, Monterey, Calif.
A SURVEY OF ALLOCATION MODELS IN SEARCH THEORY
Brian David Engler (M.S. Thesis) Sep. 1970 29 p refs
(AD-712836) Avail: NTIS CSCL 15/7

The problem of optimally allocating available effort to search for an object at sea comprises a major class of problems in naval warfare. This thesis presents in some detail Koopmans classic two-region and continuous search models, along with the n-region discrete model which provides some continuity between the two. Brief summaries of four of the more important extensions to the basic theory are also included. Author (TAB)

N71-12340# Army Natick Labs., Mass. Clothing and Personal Life Support Equipment Lab.
FLOW OF HEAT AND WATER VAPOR THROUGH PROTECTIVE CLOTHING
Ferdinand Votta, Jr. and Leo A. Spano Aug. 1970 23 p
(AD-712994; C/PLSEL-78; TR-71-5-CE) Avail: NTIS CSCL 6/7

In a continuing effort to improve the comfort and working efficiency of persons wearing various protective clothing systems, a sweating cylinder to test the heat and water vapor transfer characteristics of such systems was designed, constructed and tested. With this equipment, the heat and water vapor transfer through a carbon-treated polyurethane-nylon tricot laminated clothing system was determined under a wide range of simulated environmental conditions. Author (TAB)

N71-12341* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
HARNESS ASSEMBLY Patent
Dan H. Dane, inventor (to NASA) Issued 23 Jun. 1970 (Filed 23 Apr. 1968) 11 p Cl. 297-385; Int. Cl. A62b35/00; Int. Cl. C09b
(NASA-Case-MFS-14671; US-Patent-3,516,711;
US-Patent-Appl-SN-723476) Avail: US Patent Office CSCL 06Q

A harness assembly adapted to support a human test subject on a ground based apparatus simulating low or no gravity conditions is described. The assembly has a backrest adjustably connected to the support bar of the simulator so as to position the center of gravity of the subject in the harness at the desired location. On each side of the frame a main side member is pivotally connected to the side of the frame approximating the hip joint. Pivotally joined to the lower end is a lower side member which is adapted to be strapped to a thigh, and pivotally attached to this joint, which approximates the knee, is a member to be strapped to a lower leg. Weights are attached to the upper end of each main side member to counterbalance the weight of the legs. The human test subject can pivot his legs, and the effects of weightlessness on the legs are simulated. F.O.S.

N71-12342* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TELEMETER ADAPTABLE FOR IMPLANTING IN AN ANIMAL Patent
Thomas B. Fryer, inventor (to NASA) Issued 1 Jul. 1969 (Filed 4 Nov. 1966) 10 p Cl. 325-143; Int. Cl. H04b1/04; Int. Cl. G01k5/18, 5/52
(NASA-Case-XAC-05706; US-Patent-3,453,546;
US-Patent-Appl-SN-592694) Avail: US Patent Office CSCL 06B

A telemeter is described which generates two voltages for biomedical instrumentation. The voltage ratios are proportional to the condition monitored. Voltages are alternately sampled, and equal-duration bursts of RF energy are transmitted. The intervals between bursts are alternately T sub 1 and T sub 2. The ratio of T sub 1 to T sub 2 is equal to the ratio of the two voltages. Power supply fluctuation and other errors are cancelled as a result of the proportional voltage ratios. E.C.

N71-12343* Weber Aircraft Corp., Burbank, Calif.
ARTICULATED MULTIPLE COUCH ASSEMBLY Patent
Leon P. Stone and David L. Johansen, inventors (to NASA) Issued 9 Sep. 1969 (Filed 5 Jan. 1968) 16 p Cl. 297-68; Int. Cl. A47c1/022, 1/031, 15/00 Sponsored by NASA
(NASA-Case-MSC-11253; US-Patent-3,466,085;
US-Patent-Appl-SN-695973) Avail: US Patent Office CSCL 06Q

A multiple couch assembly is described which is applicable for astronauts and comprises side-by-side articulated couch frames, individually detachably mounted on a main supporting frame structure. The frames contain pivotally connected torso, thigh, and lower leg support sections. A releasable latch mechanism is provided to releasably secure the thigh support at angles relative to the torso support. The thigh support section is also pivotal to positions parallel to the torso section so that the couch frame is either in a compact bundle for stowage or is adapted to provide a seat. Guide track and roller means give the couch frames a degree of longitudinal movement. Fabric webbing supports body attitude and contour under excessive G forces. E.C.

N71-12344* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
PRESSURE GARMENT JOINT Patent
Michael A. Marroni, Douglas E. Getchell, and John J. Korabowski, inventors (to NASA) Issued 3 Feb. 1970 (Filed 7 Oct. 1966) 5 p Cl. 2-2.1; Int. Cl. B63c11/04
(NASA-Case-XMS-09636; US-Patent-3,492,672;
US-Patent-Appl-SN-586330) Avail: US Patent Office CSCL 06Q

A flexible, universal joint for pressurized space suits is

described. The device provides an omnidirectional joint with the following characteristics: (1) easily moved and stable in any position, (2) completely soft in the unpressurized condition, and (3) capable of retaining pressurized condition within the space suit. Ferrules and guides are provided for the passage of cables through the joint. P.N.F.

N71-12345* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

EMERGENCY ESCAPE SYSTEM Patent

Jack A. Kinzler and David L. McCraw, inventors (to NASA) Issued 20 Jan. 1970 (Filed 3 Apr. 1969) 6 p Cl. 29-400; Int. Cl. B23p17/00, 1904

(NASA-Case-MSC-12086-1; US-Patent-3,490,130; US-Patent-Appl-SN-812999) Avail: US Patent Office CSCL 06G

A system for providing emergency, man-sized passageways in the walls of an enclosure is described. The device provides a means of instantaneously cutting openings through the wall of enclosure so as to permit the immediate exit of personnel in the event of an emergency. A die member containing a draw bar assembly is attached to a pivotal support member located on the exterior surface of the enclosure. Interior and exterior controls are provided to energize a power source which actuates the draw bar and cuts out a man-sized section of the wall to provide an emergency exit or ingress. P.N.F.

N71-12346* Institute of Research and Instrumentation, Houston, Tex.

PRESSED DISC TYPE SENSING ELECTRODES WITH ION-SCREENING MEANS Patent

Benjamin Mosier and Joe L. Day, inventors (to NASA) Issued 20 Jan. 1970 (Filed 5 Jan. 1967) 5 p Cl. 128-2.1; Int. Cl. A61b5/05; Int. Cl. H01b1/02 Sponsored by NASA

(NASA-Case-XMS-04212-1; US-Patent-3,490,440; US-Patent-Appl-SN-607461) Avail: US Patent Office CSCL 09E

An improved pressed electrode for biopotential applications is discussed. The electrode is formed of intimately commingled powders of relatively small size in which silver, silver halogen salt, and a colloidal material comprising an ion screening means are pressed to form the electrical contact. The electrode permits passage of the biopotential signal with minimum noise from the electrode and reduces the effects of chemical poisoning produced by perspiration from the skin of the subject. P.N.F.

N71-12347# Massachusetts Univ., Amherst. School of Engineering.

THE LIFE SUPPORT SYSTEM FOR THE SEA-BED OBSERVATION LABORATORY

David B. Wyman (M.S. Thesis) Jul. 1970 79 p refs

(Contract N00014-68-A-0146-0006; Proj. Themis)

(AD-712823; THEMIS-UM-70-4) Avail: NTIS CSCL 6/11

The investigation covers the systems engineering involved with the selection of an optimum life support system for the Sea-Bed Observation Laboratory. The life support system must supply breathing gases, maintain the temperature and humidity within the comfort zone, provide instrumentation for monitoring the atmosphere, and provide an emergency breathing system. The factors of weight, volume, power, safety, reliability and life cycle cost have all been considered in the selection of the optimum components for the life support system. Author (TAB)

N71-12348# Southwest Research Inst., San Antonio, Tex.

AUTOMATIC FIRE PROTECTION SYSTEM FOR MANNED HYPERBARIC CHAMBERS. PHASE 1: SYSTEM DEVELOPMENT Final Report, 13 Jun. 1968 – 1 Aug. 1970

Lester A. Eggleston, William R. Herrera, and George E. Commerford 1 Aug. 1970 137 p refs

(Contract N62399-68-C-0022; SwRI Proj. 03-2383)

(AD-712848; NCEL-CR-70-003) Avail: NTIS CSCL 13/12

The problems of fire detection and suppression in dense atmospheres typical of diving chamber service are analyzed, with special attention to nitrogen-oxygen up to 8 atm and helium-oxygen up to 45 atm. Spectral comparisons indicate either infrared or ultraviolet flame detectors may be used. The current IR equipment is the better choice. There is a need for a combustion products detector and an acceptable model is available. Although it is sensitive to changes in atmospheric density, automatic compensation is feasible. Dense atmospheres affect the performance of water spray nozzles. Complete data are given for a typical line of commercial nozzles for four sizes and five nozzle angles, at flow pressures of 60 psig and chamber pressures up to 500 psig. A water rate for suppression is estimated at 2-3 gpm/sq ft, and supported by fire test data. The flash-off of dissolved gases can be a serious problem in system design. A closed water loop balanced to chamber pressure and pump driven when needed is preferred to any system which exposes water to gas pressures above the chamber operating level for periods long enough to permit saturation. Author (TAB)

N71-12349# Atomic Energy Commission Research Establishment, Riso (Denmark).

SIMULATION OF RECOGNITION LAYER NETS BY MEANS OF THE DIGITAL COMPUTER PDP-8

R. Dulewicz Feb. 1970 29 p

(PB-192138; RISO-M-1232; R-1-70) Avail: NTIS CSCL 06D

In the preliminary stages of the work concerning a technical implementation of the simulation of recognition layer nets by means of the digital computer PDP-8, a method of detecting information points was developed. The method was used in an attempt to recognize not only the information points, but complete letters. It should be emphasized that the work was not intended to develop a universal recognition system, but to prove the practical possibility of detecting the information points by a simple method based on the application of layer nets organized according to the rule of lateral influences. Such two-layer networks capable of detecting the characteristic features of pictures were simulated by means of the digital computer PDP-8. Author (USGRDR)

N71-12350# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

PERFORMANCE RATINGS AND PERSONALITY FACTORS IN RADAR CONTROLLERS

Samuel Karson and Jerry W. O'Dell Sep. 1970 4 p refs Presented at 1969 Ann. Meetings of the Aerospace Med. Assoc., San Francisco

(AM-70-14) Avail: NTIS

The problem of whether primary or second-order personality questionnaire factors were related to job performance ratings on the Employee Appraisal Record of 264 controllers was investigated. A Pearson correlation matrix was computed based on 19 variables which included EAR parts 2 and 4, a motivational distortion score, and the primary factors measured by the Sixteen Personality Factor Questionnaire. A principal axis factor analysis was completed with varimax rotation which yielded eight second-order factors which were identified as follows: anxiety versus dynamic integration, subduedness versus independence, criterion, cortertia versus pathemia, exvia versus invia, intelligence, obsessive-compulsive, and rebelliousness. While all of these second-order factors were identified previously, the criterion variables were not related to any of the personality measures. A discussion of the results led to the conclusion that the criterion problem needs to be solved before progress can be expected. Author

N71-12351* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

BACKPACK CARRIER Patent

Amos A. Spady, Jr. and Frank G. Read, inventors (to NASA) Issued 3 Feb. 1970 (Filed 10 Oct. 1967) 8 p Cl. 224-25; Int. Cl. A45d3/10; Int. Cl. A47d13/02

(NASA-Case-LAR-10056; US-Patent-3,493,153; US-Patent-Appl-SN-674357) Avail: US Patent Office CSCL 06Q

A backpack carrier is described, suitable for use by lunar explorers, with retractable support legs which allows the user to don the carrier without bending, or lifting. A clearance cavity provides the capability for its being donned over an in-place load, and it is convertible to a wheeled rescue vehicle. F.O.S.

N71-12352# General Electric Co., Philadelhphia, Pa. Missile and Space Div.

CLOSED CYCLE RESPIRATOR DEVELOPMENT PROGRAM Final Report

25 Sep. 1970 6 p refs

(Contract N00014-69-C-0329)

(AD-712560; RDP-021) Avail: NTIS CSCL 6/11

The original objective of the Closed Cycle Respirator Development Program was to produce four portable volume controlled prototype respirators. Subsequently, the program was expanded to include the design and construction of a test device to analytically evaluate the performance characteristics of the prototype respirators. This device was appropriately referred to as the lung simulator. Four prototype units were delivered to the National Naval Medical Center (NNMC). Operating manuals covering the operation and maintenance procedures for the prototype respirators and the lung simuator were delivered respectively with the equipment. Author (TAB)

N71-13428*# Naval Aerospace Medical Inst., Pensacola, Fla. Research Lab.

NUCLEAR EMULSION RECORDINGS OF THE ASTRONAUTS' RADIATION EXPOSURE ON THE FIRST LUNAR LANDING MISSION APOLLO 11

Hermann J. Schaefer and Jeremiah J. Sullivan 29 Jun. 1970 30 p refs Sponsored by NASA

(NASA-CR-115804; AD-711316; NAMRL-1112) Avail: NTIS CSCL 06R

Ilford G.5 and K.2 emulsions in radiation packs carried by the astronauts on Apollo XI in their space suits were analyzed for identifying the various components of the radiation field in space and determining the total mission dose. In terms of dose equivalents, trapped protons in the radiation belt, disintegration stars in tissue, galactic heavy primaries, electrons, and neutrons contribute in that order to a total mission dose of 201 millirad or 402 millirem. In this exposure, the high-ZE particles with LET values up to 3600 kev/micron tissue constitute a radiobiologically unknown quantity since it is generally agreed upon that microbeam effects in tissue cannot be measured adequately with conventional dosimetric units. Assuming that the effects in question are limited to nuclei of Z = 22 and higher, one arrives at a total mission flux of 76 nuclei/sq. cm. measured on the body of the astronaut; this cannot be properly assessed in its biological significance. Author (TAB)

N71-13429# Weather Bureau, Salt Lake City, Utah.

EXPERIMENTAL AIR QUALITY FORECASTS IN THE SACRAMENTO VALLEY

Norman S. Benes Aug. 1970 23 p refs

(PB-194128; ESSA-TM-WBTM-WR-53) Avail: NTIS CSCL 13B

About 400,000 acres of rice are harvested annually in the Sacramento Valley. The disposal of straw and rubble residue after harvest presents a problem of large proportions to the rice grower. Historically, burning of this straw has been the most efficient means of disposal. With steady urban encroachment into the agriculturally productive areas of California, a tolerance limit is fast approaching regarding acceptable air quality standards. Individual counties within the air basins retained the right to establish their own air pollution control district. Author (USGRDR)

N71-13430# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

TWO-FLASH THRESHOLDS AS A FUNCTION OF COMPARISON STIMULUS DURATION

Sep. 1970 6 p refs

(FAA-AM-70-15) Avail: NTIS

The proposal that two-flash thresholds may be used as direct measures of the critical duration of Bloch's law was tested. Two-flash threshold was found to be an increasing function of comparison stimulus duration for durations of 3 to 22 msec indicating that two-flash threshold does not measure the critical duration. Increasing luminance in the range of 1.0 to 3.0 log mL enhanced the effect. Application of these data to specifications for strobe lights used as anticollision devices is discussed. Author

N71-13431# Joint Publications Research Service, Washington, D.C.

HELIOGEOPHYSICAL FACTORS IN INFECTIONS

Z. P. Konovalenko et al 16 Nov. 1970 17 p refs Transl. into ENGLISH from Izv. Vses. Geogr. Obshchestva (USSR), no. 4, 1970 p 347-355

(JPRS-51788) Avail: NTIS

The periodicity of epidemics was investigated and compared to that of sunspots. Epidemics of malaria, whooping cough, diphtheria, and scarlet fever were studied using data from the 1880's from Europe, Japan, and the United States. It is concluded that epidemic cyclicity is dominated by periods of 3, 5, 8, 11, 14, and 18-19 years. It is felt that part of these cycles is related to special features of solar activity, and particularly to its abrupt changes. It is suggested that the influence of solar activity may be direct or through climatohydrological conditions. It may be achieved through changes in the reactivity of the human organism, the biological properties of the microorganism, and channels of infection transmission. N.E.N.

N71-13432# National Defense Research Organization TNO, The Hague (Netherlands). Chemistry Lab.

A SIMPLIFIED SLIDE RULE FOR THE DETERMINATION OF DOWNWIND SAFETY LIMITS FOR TOXIC VAPOURS [EEN VEREENVOUDIGDE REKENSCHIJF VOOR HET BEPALEN VAN BENEDENWINDSE DAMPVEILIGHEIDS-GRENZEN]

C. J. P. van Buijtenen May 1970 25 p refs In DUTCH; ENGLISH summary

(Rept-1970-13) Avail: NTIS

A description is given of how a simplified version was constructed of a previously constructed slide rule for the determination of the safety limits downwind from an instantaneous source of toxic vapor. The simplification could be realised without significant loss of accuracy by using stability classes instead of continuously variable stability parameters and by using a different way of introducing the sourcelength correction factor. Author

N71-13433# Flying Personnel Research Committee, London (England).

A BRIEF DESCRIPTION OF FIVE PUBLISHED PAPERS

RELATING TO WORK PARTIALLY SUPPORTED BY A MINISTRY OF DEFENCE (AIR) EXTRA-MURAL RESEARCH GRANT ON THE USE OF LOWER BODY SUCTION AND SIMILAR TECHNIQUES IN THE STUDY OF CARDIOVASCULAR REACTIONS TO FLIGHT

Feb. 1970 3 p refs

(FPRC/1298) Avail: NTIS

Summaries are presented of papers on subatmospheric pressure effects on blood vessels of the forearm, treatment of idiopathic orthostatic hypotension, electromagnetic pressure generator for testing pressure transducers and catheter systems, and dome design for pressure transducer. N.E.N.

N71-13434*# Texas Womens Univ. Research Inst., Denton.

BONE DENSITY STUDIES OF BED REST SUBJECTS AT THE PUBLIC HEALTH SERVICE HOSPITAL IN SAN FRANCISCO, BY THE TEXAS WOMENS UNIVERSITY RADIOGRAPHIC METHOD Final Report

[1970] 153 p refs

(Contract NAS9-9427)

(NASA-CR-114784) Avail: NTIS CSCL 06P

The results are presented of a program aimed at the radiographic measurement of bone density changes in subjects participating in a bed rest - phosphate study. The data obtained represent measured changes in bone density at 12 week intervals for two groups of subjects. Data summaries include: (1) the effect of exercise and phosphate on bone density of multiple sections of the phalanx 4/2, phalanx 5/2, and os calcis; (2) changes in bone density resulting from exercise and a dietary supplement on a section at the distal end of the radius, a section at the distal end of the ulna, and a section across the capitate, (3) the effect of exercise and phosphate on bone density of the distal radius and capitate; and (4) bone density changes of specified bones for respective subjects. D.L.G.

N71-13435*# Texas Womens Univ. Research Inst., Denton.

EVALUTION OF FLIGHT FOODS UNDER HYPOKINETIC CONDITIONS, PART 1, CHAPTERS 1, 2, AND 3 Final Report

[1970] 195 p refs

(Contract NAS9-9755)

(NASA-CR-114780) Avail: NTIS CSCL 06H

An investigation is reported involving eight men who participated in a bed rest study which included a 16 day pre-bed rest equilibration period, a 56 day bed rest period, and a 2 week post-bed rest reconditioning period. The purpose of the investigation was: (1) to assess the nutritional value and the acceptability of currently available flight foods when fed for periods of time equivalent to AAP missions 3A and 3/4 under metabolic conditions similar to those which will pertain during these long exposures to null gravity; and (2) to obtain baseline data which will enhance the capability of interpreting the results of the AAP experiment on nutrition and musculoskeletal function. Methodology involved in the investigation is described and the data obtained are tabulated. Author

N71-13436*# Texas Womens Univ. Research Inst., Denton.

EVALUATION OF FLIGHT FOODS UNDER HYPOKINETIC CONDITIONS, PART 2, CHAPTERS 4 AND 5

C. M. Winget, S. E. Cronin, N. W. Hetherington, and L. S. Rosenblatt [1970] 126 p refs

(Contract NAS9-9755)

(NASA-CR-114781) Avail: NTIS CSCL 06H

The results are reported of a study to assess the effect of simulated null gravity for 56 days on the daily wave forms of body temperature and heart rate in normal human subjects. A second objective of the study was to ascertain methods for best describing in quantitative terms the observed changes in these physiological parameters. A discussion of the methodology employed is given and the data obtained are tabulated. Author

N71-13437*# Texas Womens Univ. Research Inst., Denton.

EVALUATION OF FLIGHT FOODS UNDER HYPOKINETIC CONDITIONS, PART 3, CHAPTERS 6 AND 7

[1970] 180 p refs

(Contract NAS9-9755)

(NASA-CR-114782) Avail: NTIS CSCL 06H

The results are reported of an investigation of urinary 17-hydroxycorticosteroids during a 56 day bed rest period. The material presented, however, encompasses these results and those of a previous study on the metabolism, including periodicity, of 17-ketosteroids. Both studies are described and data summaries are included. D.L.G.

N71-13438# Battelle Memorial Inst., Columbus, Ohio.

INVESTIGATION OF SCUBA CYLINDER CORROSION, PHASE 1 Final Report, Mar.–Aug. 1970

N. C. Henderson, W. E. Berry, R. J. Eiber, and D. W. Frink Sep. 1970 116 p refs

(Contract N00014-69-C-0352)

(AD-712815) Avail: NTIS CSCL 13/4

A program was conducted to determine the cause of the corrosion that was discovered in a number of aluminum scuba cylinders, and to determine whether the rupture strength of the cylinders had been degraded by the corrosion. An examination was made of 68 corroded cylinders received from Naval facilities. Rupture experiments were conducted on new cylinders and on the most severely corroded cylinders. Detailed analyses were made of corrosion products from selected aluminum cylinders, and of corroded and uncorroded material from the ruptured cylinders. It was concluded that the corrosion in the cylinders examined had not significantly reduced the rupture strength of the cylinders. Recommendations were formulated concerning changes in manufacturing specifications, cleaning procedures, and inspection procedures to provide increased assurance that corrosion will not progress to the point of significantly degrading the rupture strength of aluminum scuba cylinders. Author (TAB)

N71-13855# Argonne Universities Association, Ill.

UNIVERSITIES, NATIONAL LABORATORIES, AND MAN'S ENVIRONMENT CONFERENCE

Nov. 1969 167 p Conf. held at Chicago, 27-29 Jul. 1969 Sponsored by AEC

(CONF-690705) Avail: NTIS

The proceedings of a conference on the role of the national laboratories and universities in the solution of environmental problems are presented. Papers were presented on social problems and the interaction of problem solving agencies; standards for, and the control of, environmental quality; waste disposal practices; radiation protection standards; research requirements; and automobiles and air pollution. NSA

N71-13866# Technische Hochschule Darmstadt (West Germany). Fakultaet fuer Maschinenbau.

ELECTROMYOGRAPHY AS SCIENTIFIC RESEARCH METHOD FOR EVALUATING STATIC MUSCLE WORK [ELEKTROMYOGRAPHIE ALS ARBEITSWISSENSCHAFTLICHE UNTERSUCHUNGSMETHODE ZUR BEURTEILUNG VON STATISCHER MUSKELARBEIT]

Wolfgang Laurig (Ph.D. Thesis) 1970 107 p refs In GERMAN
Avail: NTIS

The classical stretch reflex model is used to develop functional mathematical models for muscle control during static work and for an antagonistical muscle group. A qualitative description of the control behavior for the stabilization of the optimal reaction power of static muscle work is obtained. Correlative analyses establish that in this control loop the electromyogram consist of an uncontrolled signal with superimposed periodic components. Normalized defined boundary conditions are used to reproduce the scattered field of the electrical activity. Studies on variously sized muscles establish the effects of cohesion and duration on electrical activity during static muscle work. Relaxation studies show that intervals reduce the time-dependent part of the electrical activity. Comparative pulse frequency measurements confirm the close relationship between electrical activity behavior and pulse frequency during static muscle work. Transl. by G.G.

N71-13867# Pennsylvania Univ., Philadelphia. Johnson Research Foundation.

ENERGY METABOLISM AND ITS CONTROL IN HIGHER PLANTS Progress Report, Sep. 1968 –Jul. 1970

Walter D. Bonner, Jr. 13 Jul. 1970 30 p refs
(Contract AT(D-1)-3729)
(TID-25485) Avail: NTIS

Efforts in a continuing program of research are reported and include: (1) investigations on the kinetics of cytochrome oxidation in mung beam hypocotyl mitochondria and in skunk cabbage spadix mitochondria; (2) studies of the metabolic events ingermanating peanut embryos during the first few hours following inbibition; (3) optical studies of castor beam glyoxysomes including spectrophotometric observations of the catalase and flavoproteins contained in these organelles as well as fluorescence observations on both pyridine nucleotide and flavoproteins; and (4) investigations of phosphorylation sites in the plant mitochondrial respiratory chain. D.L.G.

N71-13868*# National Aeronautics and Space Administration. Washington, D.C.

POLYCYTHEMIA IN SUBJECTS ENGAGED IN UNDERWATER ACTIVITY [POLYGLOBULIA IN SOGGETTI ESERCITANTI ATTIVITA SUBACQUEA]

P. Sannazzari et al Dec. 1970 5 p refs Transl. into ENGLISH from Boll. Soc. Ital. Biol. Sper. (Italy), v. 45, no. 7, 1969 p 399-401
(NASA-TT-F-13422) Avail: NTIS CSCL 06P

The results of polycythemia examinations conducted in 140 professional underwater workers are reported. It is concluded that polycythemia and a fall in hemoglobin result from an imperfect blending of respiratory and alveolar air, which is due to pressure and temperature conditions unique to underwater work. Author

N71-13876# Advisory Group for Aerospace Research and Development, Paris (France).

EDUCATION AND TRAINING IN AEROSPACE MEDICINE, 1970

D. I. Fryer, ed. Nov. 1970 135 p refs Presented at AGARD Aerospace Med. Panel Specialist Meeting, Oslo, 12-13 May 1970
(AGARD-CP-75-70) Avail: NTIS

Papers are presented on civil and military aerodmedical practitioners, short-service medical officers, medical auxiliaries, flight nurses and aircrews, and survival training. For individual titles see, N71-13877 through N71-13897.

N71-13877# Canadian Armed Forces of Environmental Medicine, Toronto (Ontario). School of Aviation Medicine.

AEROMEDICAL TRAINING IN THE CANADIAN FORCES

C. A. Burden *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 9 p (See N71-13876 04-04)
Avail: NTIS

The current aeromedical training programs in the Canadian Forces are presented. The activities of the School of Aviation Medicine in training aviation medical personnel is discussed. Also presented is the organization and activities of the aeromedical training units in the field in order to illustrate the continuing education and training of aircrew and jet passengers. Operational aeromedical support is mentioned as a part of the field aeromedical unit function. In describing the School of Aviation Medicine, the paper gives a resume of the courses given to flight surgeons, bioscience officers, bioscience technicians, flight safety officers, aircrew and jet passengers. Additional training available to flight surgeons and bioscience officers is included, as is School of Aviation Medicine assistance in the aeromedical education of civilian aircrew. Author

N71-13878# School of Aerospace Medicine, Brooks AFB, Tex.

EDUCATION OF THE UNITED STATES AIR FORCE FLIGHT SURGEON

Samuel J. Brewer *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 7 p (See N71-13876 04-04)
Avail: NTIS

The Aerospace Medicine Program of the United States Air Force functions to promote and maintain the physical and mental health of Air Force personnel. Surgeons are required at all levels of command to manage and participate in this program. The content and method of teaching various courses at the United States Air Force School of Aerospace Medicine to provide trained physicians for these requirements are presented. Author

N71-13879# Army Aviation School, Fort Rucker, Ala. Dept. of Aeromedical Education and Training.

AVIATION MEDICINE TRAINING PROGRAMS IN THE US ARMY

William G. Caput *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 7 p (See N71-13876 04-04)
Avail: NTIS

The aviation medicine training programs of the U.S. Army are discussed. Subjects presented are: (1) basic Army flight surgeon training, (2) intermediate and specialized Army aviation training programs, (3) advanced Army aviation medicine training program, and (4) physiological training program for flying personnel. Author

N71-13880# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

AVIATION MEDICINE TRAINING IN THE ROYAL AIR FORCE

H. L. Roxburgh *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 4 p (See N71-13876 04-04)
Avail: NTIS

The historical development of training in aviation medicine in the Royal Air Force is briefly described. The present situation is outlined and possible weaknesses indicated along with suggestions for improvement. Author

N71-13881# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
AEROMEDICAL TRAINING IN THE ROYAL AIR FORCE: THE ROLE OF TRAINING SECTION AT THE ROYAL AIR FORCE INSTITUTE OF AVIATION MEDICINE
A. T. Johnson and E. D. J. Diaper *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 7 p (See N71-13876 04-04)
Avail: NTIS

The functions of the Training Section of the Royal Air Force Institute of Aviation Medicine are discussed. Subjects presented are: (1) responsibilities of the training section, (2) nature of the training programs conducted, and (3) personnel and textbooks used for the courses. Author

N71-13882# Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris (France).
CURRENT AEROMEDICAL EDUCATION IN FRANCE
A. R. Missenard *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 6 p (See N71-13876 04-04)
Avail: NTIS

Aerospace medicine training programs in France are discussed. Subjects presented are: (1) basic training in aviation medicine, (2) specialized training in aviation medicine, and (3) training of paramedical personnel. Author

N71-13883# Flugmedizinisches Institut der Luftwaffe, Fuerstenfeldbruck (West Germany).
AEROMEDICAL TRAINING PROGRAM FOR MEDICAL AND PARAMEDICAL PERSONNEL IN THE GERMAN ARMED FORCES
A. J. Garbe *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 6 p (See N71-13876 04-04)
Avail: NTIS

The types, duration, and curricula of training courses held at the Institute of Aviation Medicine of the German Air Force are discussed. Subjects presented are: (1) primary course in aviation medicine, (2) indoctrination of medical officers in aviation and industrial medicine, (3) aeromedical training for dentists, (4) aeromedical technician course, and (5) training of air evacuation personnel. Author

N71-13884# Royal Norwegian Air Force, Oslo.
EDUCATION AND TRAINING IN AEROSPACE MEDICINE IN THE ROYAL NORWEGIAN AIR FORCE
Vogt Lorentzen *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 4 p (See N71-13876 04-04)
Avail: NTIS

Aerospace medical training the the Norwegian Air Force is duscussed. Subjects presented are: (1) medical officer training, (2) flight nurse training, (3) paramedical personnel training, and (4) aircrew training. Author

N71-13885# Italian Air Force Military School of Aviation Medicine, Rome.
TEACHING OF AEROSPACE MEDICINE IN THE MILITARY AND CIVIL FIELD IN ITALY
Aristide Scano *In* ATARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 6 p (See N71-13876 04-04)
Avail: NTIS

Aerospace AGARD training for Italian military and civilian flying personnel is discussed. Subjects presented are: (1) courses for medical officers, (2) courses for sanitary personnel, and (3) aerophysiological training for flight crews. Author

N71-13886# Flugmedizinisches Institutt der Luftwaffe, Fuerstenfeldbruck (West Germany).
CIVIL AEROSPACE MEDICAL ACTIVITIES IN GERMANY
Erwin A. Lauschner *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 5 p (See N71-13876 04-04)
Avail: NTIS

An increasing number of medical and technical faculties are including aeromedical subjects and lectures in their teaching programs. The main civilian aerospace medical activities are concentrated in the Institute of Aviation Medicine of the German Air Force and its civilian counterpart, the German Aerospace Medicine Association. A large part of the postgraduate training program for medical doctors is provided by these institutions. Lufthansa has finally its own aeromedical service. The situation in the German aircraft industry is still deficient but improving Author

N71-13887# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
THE DIPLOMA IN AVIATION MEDICINE OF THE ROYAL COLLEGE OF SURGEONS (ENGLAND) AND ROYAL COLLEGE OF PHYSICIANS (LONDON)
D. I. Fryer *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 7 p (See N71-13876 04-04)
Avail: NTIS

The basic requirements of training required for candidates taking the examination of the Diploma in Aviation Medicine of the Conjoint Board are described. The format of the course of instruction at Farnborough is considered and problems are outlined. Author

N71-13888# Air Corporations Joint Medical Service (BEA/BOAC), London (England).
TRAINING OF FLIGHT SURGEONS FOR CIVIL AIRLINES
F. S. Preston *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 6 p (See N71-13876 04-04)
Avail: NTIS

The history of the U.K. civil airlines and their medical departments subsequent to World War II are described. The vast majority of flight surgeons employed between 1946 and 1964 had previous medical training in the armed services. With the contraction of the latter in the sixties, it was necessary to look for recruits from elsewhere. The setting up of the U.K. Diploma of Aviation Medicine has allowed considerable input from the regulatory and airline medical departments which has ensured that diplomates are civil as well as militarily orientated. Future flight surgeons will be required to be in possession of this diploma before employment. The development of the Diploma Course to full Faculty status is a logical development as far as the United Kingdom is concerned. There is a great need in this country to ensure the steady flow of suitably qualified doctors into the civil and regulatory medical departments as the aviation industry expands. Author

N71-13889# Canadian Armed Forces of Environmental Medicine, Toronto (Ontario).
OBJECTIVITY IN AIRCREW OPERATIONAL AEROMEDICAL TRAINING
I. H. Anderson *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 8 p refs (See N71-13876 04-04)
Avail: NTIS

The necessity of effective aeromedical training of operational aircrew is evident from accident and incident records and statistics. Examples pertaining to the Canadian Armed Forces are quoted. The requisites of effective aeromedical training, namely knowledge of the mission, adequate training aids, the best use of available instructors, a versatile teaching rationale that can be modified as mission experience dictates, are discussed and illustrated. Followup

training, the use of the practice mission and simulator missions as a training tool, and the various types of briefings that can be given are described and illustrated. Author

N71-13890# Flugmedizinisches Institut der Luftwaffe, Feurstenfeldbruck (West Germany).
PHYSIOLOGICAL TRAINING OF PILOTS AND AIRCREW IN THE GERMAN ARMED FORCES
E. Buchard *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 6 p (See N71-13876 04-04)
Avail: NTIS

The application of modern and highly sophisticated airborne weapons within the German Air Force as well as in the German Army and Navy requires a respective education and training of the flying personnel in Physiology of Flight. Because of the geographic situation of the Federal Republic of Germany this training from the beginning was centrally planned and set up; in consequence all training in physiology of flight of all pilots and aircrew of the German Armed Forces is done at the Institute of Aviation Medicine of the German Air Force located at Furstenfeld-bruck near Munich, where the basic training as well as advanced training is performed. The Physiological Training includes a profound theoretical indoctrination into the various topics as well as the application of numerous utensils for the practical training in demonstrations and exercises. Author

N71-13891# Royal Netherlands Air Force, Soesterberg. Aeromedical and Industrial Medicine Section.
EDUCATION AND TRAINING IN AEROSPACE MEDICINE IN THE ROYAL NETHERLANDS AIR FORCE
F. A. F. Cartens *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 5 p (See N71-13876 04-04)
Avail: NTIS

The physiological training in the Royal Netherlands Air Force started in 1952 under the supervision of the Surgeon General, Royal Netherlands Air Force. In 1957 the specific training on sea and land survival intensified and resulted in the foundation of the Flight Safety Training and Test Center (FSTTC). The physiological training is given as an integral part of the FSTTC. Every crew member will undergo this training every 18 months. Different courses in aeromedical education are covered and available facilities shown. Author

N71-13892# Royal Netherlands Air Force, Soesterberg. Aeromedical and Industrial Medicine Section.
SURVIVAL TRAINING IN THE ROYAL NETHERLANDS AIR FORCE
Th. Verheij *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 6 p (See N71-13876 04-04)
Avail: NTIS

Survival training for flying personnel of the Royal Netherlands Air Force is discussed: The objectives of the training course are: (1) instruction, demonstration, and exercise in the physiological problems of high performance flying, and (2) instruction, demonstration, and exercise in the correct use and handling of safety equipment. Author

N71-13893# Centre d-Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medicine Aerospatiale.
PHYSIOLOGICAL TRAINING OF AIRCREWS AND COOPERATION WITH ENGINEERS IN AEROSPACE MEDICAL PROBLEMS IN FRANCE
J. Colin *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 6 p (See N71-13876 04-04)
Avail: NTIS

The physiological training of military and civilian aircrews in France is discussed. Emphasis is placed on the cooperation with engineers on medical problems with a view to workload amelioration and improvement in flight safety. Author

N71-13894# Royal Air Force Aeromedical Training Centre, North Luffenham (England).
RESULTS OF POSITIVE PRESSURE BREATHING TRAINING AS SHOWN BY PERFORMANCE FOLLOWING RAPID DECOMPRESSION
R. B. Maclaren and B. H. Rance *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 10 p refs (See N71-13876 04-04)
Avail: NTIS

One method of providing for the survival of aircrew on exposure to low environmental pressures above 50,000 feet is to use positive pressure breathing techniques with body counter pressure applied through partial pressure clothing. The aims of aircrew indoctrination in positive pressure breathing are as follows: (1) to enable aircrew to recognise and identify the problems, (2) to train them to carry out the necessary procedures, and to minimize the problems, (3) to assist them to withstand the stresses produced by the problems and to safeguard them in their training programme. Some of the difficulties of positive pressure breathing training and the methods used to overcome them are described. The results of such training as measured by aircrew performance on rapid decompression in a decompression chamber are discussed and related to these problems and training methods. Author

N71-13895# School of Aerospace Medicine, Brooks AFB, Tex. Physiological Education Branch.
DEVELOPMENT OF PNEUMATIC EJECTION SEAT TRAINERS
Jared M. Dunn *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 7 p (See N71-13876 04-04)
Avail: NTIS

The USAF School of Aerospace Medicine has developed a compressed air catapult to be used in connection with Air Force ejection seat trainers. This device insures a safe and economically operated system that can duplicate simulated peak accelerations and rate of onset produced by the cartridge-powered catapult currently used in the USAF physiological training program. An emergency egress sequence trainer has been designed and developed to include all phases of escape from aircraft, such as ejection, seat separation, opening shock, and parachute landing. This device utilizes a pneumatic-powered ejection seat system which will allow a subject to be fired to a predetermined height where seat separation takes place and a brief free fall to the length of parachute risers that are attached to a carriage and cable assembly which provides a controlled descent capability. Author

N71-13896# Ecole d'Application de Medecine Aeronautique, Paris (France).
SPECIAL ASPECTS OF THE TEACHING OF RADIOLOGY AND RADIOBIOLOGY IN AVIATION MEDICINE
R. P. Delahaye *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 6 p (See N71-13876 04-04)
Avail: NTIS

Radiology plays an effective role in many areas of aviation medicine: detection of diseases and selection of candidates, flying

personnel fitness control, research, aircraft accident investigations, man's adaptation to equipment. The teaching of radiology in aviation medicine proves indispensable to acquaint students with some specific aspects of relevant diseases, as well as with the value and limitations of the methods used. At the selection stage, it is important to know the experts' attitudes and their reasons in evaluating a certain number of facts: normality, the characteristics of which evolve with time, selection criteria in terms of lesions observed and experts' prveious positions. When studying diseases relevant to aviation students should be given a detailed description of the radiological aspects of the main diseases commonly encountered: fracture of the spine, digestive and excretory.
Author

N71-13897# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
TABULATION OF RESULTS OF FLIGHT SURGEON TRAINING QUESTIONNAIRE
D. I. Fryer *In* AGARD Educ. and Training in Aerospace Med., 1970 Nov. 1970 3 p (See N71-13876 04-04)
Avail: NTIS

The education, experience, and qualifications of flight surgeons and medical personnel of various countries is presented. Variety of courses, main training subjects, course schedules, duration, and number of students are discussed. A summary of the subjects discussed during the conference on aerospace medicine is provided.
Author

N71-13898*# National Academy of Sciences-National Research Council, Washington, D.C. Space Science Board.
SPACE BIOLOGY
1970 61 p refs
(Contract NSR-09-012-075)
(NASA-CR-115803) Avail: NTIS CSCL 06B

Biological investigations in the space environment were considered in the context of the general advancement of biology as a whole. Recommended subjects for research are: (1) circadian rhythms, (2) cells, plants and invertebrates in space, (3) man and vertebrates in space, (4) radiobiology, and (5) animal orientation and tracking.
F.O.S.

N71-13899# Hittman Associates, Inc., Columbia, Md.
DEVELOPMENT OF IMPROVED CAPACITIVE ELECTRODES FOR ELECTROCARDIOGRAPHIC MONITORING Final Report
William M. Kaufman 25 Jul. 1970 36 p refs
(Contract PHS-69-2239)
(PB-194496; HIT-462; NIH-69-2239-1) Avail: NTIS CSCL 06B

The work culminated in the development of an operational prototype capacitive electrode which consists of a self-contained preamplifier and a thin-film coupling capacitor and which, although not designed for clinical use, could be used to obtain physiological electrocardiographic signals. The thin-film coupling capacitor is made of Mylar (TM) and can be easily replaced if it should become damaged. Previous designs involved coupling films that were integral portions of the entire electrode package, thus, when the thin coupling film became damaged, the entire electrode had to be replaced. The integral preamplifier required dc power, so a battery box was provided with each set of monitoring electrodes. A coupling filter for each electrode was included in each battery box to provide controlled shaping of the frequency response characteristics of each electrode.
Author (USGRDR)

N71-14429*# California Univ., Berkeley.
BIOLOGICAL CYBERNETICS
Lawrence Stark *In* NASA. Electron. Rs. Center Future Fields of Control Appl. Aug. 1969 p 23-38 (See N71-14426 04-34)
Avail: NTIS CSCL 06B

Biological control systems analysis technology is surveyed in terms of information theory; physiology, biophysics, and biochemistry; medicine; bionics or computer design and pattern recognition; and revisions in medical education programs. A bioengineering advanced graduate training course on biological control systems is outlined.
E.C.

N71-14463# Joint Publications Research Service, Washington, D.C.
SLEEP AND TRANSITIONAL STATES IN MAN UNDER SPACE FLIGHT CONDITIONS
10 Nov. 1970 11 p refs Transl. into ENGLISH from the Publ. 'Materialy Impoziuma po Izucheniyu Osobennostey Sna I Perekhodnykh Sostoyaniycheloveka Primenitelno K Zadacham i Usloviyam Kosmicheskogo Poleta (22-24 January 1968)' Moscow, Izd. An SSSR, 1968 p 40-46 and 89-91
(JPRS-51763) Avail: NTIS

CONTENTS:

1. SIGNIFICANCE OF SLEEP IN THE EVALUATION OF MAN'S INDIVIDUAL PSYCHOLOGICAL CHARACTERISTICS O. N. Kuznetsov et al p 1-3 refs (See N71-14464 04-04)
2. SLEEP AS INDICATOR OF MAN'S ABILITY TO ADAPT TO CONDITIONS OF PROLONGED SOLITARY ISOLATION WITH ALTERED DAY-NIGHT REGIMES O. N. Kuzetson et al p 4-7 refs (See N71-14465 04-04)
3. THE POSSIBILITY OF APPLYING AUTOGENOUS TRAINING FOR THE PSYCHOLOGICAL PREPARATION OF MAN FOR SPACE FLIGHTS A. M. Svyadoshch et al p 8-10 refs (See N71-14466 04-05)

N71-14464# Joint Publications Research Service, Washington, D.C.
SIGNIFICANCE OF SLEEP IN THE EVALUATION OF MAN'S INDIVIDUAL PSYCHOLOGICAL CHARACTERISTICS
O. N. Kuznetsov et al *In its* Sleep and Transitional States in Man Under Space Flight Conditions 10 Nov. 1970 p 1-3 (See N71-14463 04-04)
Avail: NTIS

Sleep characteristics effecting human performance on aircraft, submarines, and spacecraft are examined. Test results of astronauts kept in soundproof chambers over a prolonged period of time are discussed. Differential criteria for sleep are also presented, including (1) length, ritual, sterotypy, and certainty of falling asleep; (2) the ability to fall asleep at various hours of day or night; (3) the ability to vary time of nocturnal falling asleep; (4) the requirement for sleep during periods of habitual wakefulness; and (5) duration and depth of sleep.
J.A.M.

N71-14465# Joint Publications Research Service, Washington, D.C.
SLEEP AS INDICATOR OF MAN'S ABILITY TO ADAPT TO CONDITIONS OF PROLONGED SOLITARY ISOLATION WITH ALTERED DAY-NIGHT REGIMES
O. N. Kuzetsov et al *In its* Sleep and Transistional States in Man Under Space Flight conditions 10 Nov. 1970 p 4-7 refs (See N71-14463 04-04)
Avail: NTIS

Man's neuropsychic stability was studied using a soundproof chamber with an altered day-night regime. The main parameters of the external medium affecting sleep were: isolation, duration of required sleep, shifting of hours of sleep in relation to the usual time, determined interruption of sleep, and relative discomfort. A complex invextigation of sleep varieties with different daily regimes,

simultaneous with an efficiency study, permitted making an analysis of the subjective difficulties in adaptation to shifted and intermittant regimes. J.A.M.

N71-14466# Joint Publication Research Service, Washington, D.C.

THE POSSIBILITY OF APPLYING AUTOGENOUS TRAINING FOR THE PSYCHOLOGICAL PREPARATION OF MAN FOR SPACE FLIGHTS

A. M. Svyadoshch et al *In its* Sleep and Transitional States in Man Under Space Flight Conditions 10 Nov. 1970 p 8-10 refs (See N71-14463 04-04)

Avail: NTIS

Muscular relaxation is suggested for psychological preparation of man for prolonged space flights. Subjects who had never experienced hypnosis were taught through autosuggestion to slow down their heart rate from 68 to 46 beats/min or to increase it up to 144 beats/min, and to evoke a general muscular catalepsy with flexibility or cataleptic bridge and, in contrast, a state of weakened striated and smooth muscles. Experimental results of autogenous training are briefly reviewed. J.A.M.

N71-14468*# Cornell Univ., Ithaca, N.Y. Center for Radiophysics and Space Research.

DETECTION OF SEVERAL NON-PROTEIN AMINO ACIDS IN THE PRESENCE OF PROTEIN AMINO ACIDS

Paul Shapshak [1970] 11 p refs Submitted for publication

(Grant NGR-33-010-101)

(NASA-CR-115805; CRSR-408) Avail: NTIS CSCL 06A

Evidence is presented that the following nonprotein amino acids are detectable and simultaneously distinguishable from protein amino acids: alpha-amino butyric acid, beta-alanine, taurine, nor-valine, sarcosine, nor-leucine, homocystine, betaine, hydroxy-proline, and L, L-alpha, epsilon diamino-pimelic acid. Urea was also run. Data for cis-delta to the 4th power-dehydro-lysine, and 3,5-diamino-hexanoic acid which appear close to lysine in the amino analysis chromatogram are also given. The Beckman Model 120 Amino Acid Analyzer was used in these studies. Author

N71-14469# RAND Corp., Santa Monica, Calif.

INDUCED FIELDS AND HEATING WITHIN A CRANIAL STRUCTURE IRRADIATED BY AN ELECTROMAGNETIC PLANE WAVE

A. R. Shapiro, R. F. Lutomirski, and H. T. Yura Sep. 1970 33 p refs

(AD-712845; P-4458) Avail: NTIS CSCL 6/18

The induced fields and the static heating patterns within a multi-layered spherical model that approximates the primate cranial structure irradiated by plane waves in the microwave spectrum are calculated. The relation of the model to the biological structure and the sensitivity of the results to the uncertainties in the dimensions and electrical properties of biological material are investigated. A method of solution for both the scattered and interior fields for a sphere with an arbitrary number of electrically different concentric layers is developed in a form readily amenable to machine computation. It is shown that the semi-infinite slab model is inappropriate for calculating the microwave radiation dosage to the human head and similar structures. Author (TAB)

N71-14470# Atomic Energy Commission, New York. Health and Safety Lab.

FALLOUT PROGRAM Quarterly Summary Report, 1 Sep.-1 Dec. 1969

Edward P. Hardy, Jr. and Joseph Rivera 1 Jan. 1970 410 p refs

(HASL-217) Avail: NTIS

Data are presented from the HASL Fallout Program, The National Radiation Laboratory in New Zealand, the EURATOM Joint Nuclear Research Centre at Ispra, Italy, and the Radiological Physics Division at Argonne National Laboratory. Interpretive reports and notes cover the following topics: strontium-90 levels in 1968 Czechoslovakian human bone, cesium-137 concentrations at moderate depths in the Pacific (1965 to 1968), land run-off and ocean fallout radioactivity, quality control analyses at HASL and induced radionuclides from recent French and Chinese thermonuclear tests. Subsequent sections include tabulations of radionuclide levels in stratospheric air by balloon-borne and aircraft samplers, surface air, fallout, milk, other diet components, and tap water. A bibliography of recent publications related to radionuclide studies is also presented. Author

N71-14471*# National Aeronautics and Space Administration, Washington, D.C.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES

Nov. 1970 127 p refs

(NASA-SP-7011) Avail: NTIS CSCL 06B

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative effort of the American Institute of Aeronautics and Astronautics (AIAA) and NASA Scientific and Technical Information Facility. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Supplements are identified by the same number followed by two additional digits in parentheses. In its subject coverage, Aerospace Medicine and Biology concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. Author

N71-14472# National Air Pollution Control Administration, Raleigh, N.C.

NITROGEN OXIDES: AN ANNOTATED BIBLIOGRAPHY

Aug. 1970 636 p refs

(PB-194429; NAPCA-Pub-AP-72) Avail: SOD $2.75; NTIS CSCL 13B

Approximately 1500 abstracts of technical literature related to nitrogen oxides and air pollution are presented. The abstracted literature was collected from many sources; all are now included in the information retrieval system of the Air Pollution Technical Information Center (APTIC). Most of the literature is recent (1959-1970). The abstracts are arranged in thirteen broad subject categories. Subject, author, and geographic location indexes are included; the author index lists first and second (if any) authors individually. The geographical location index includes two sections; United States (states/cities); and foreign (countries/cities). Author (USGRDR)

N71-14473# Atomic Energy Commission, Washington, D.C.

ENVIRONMENT: A GLOBAL PROBLEM, AN INTERNATIONAL CHALLENGE

Glenn T. Seaborg 10 Aug. 1970 8 p Presented at the Environ. Aspects of Nucl. Power Sta., New York
(CONF-700810-37) Avail: NTIS

The effects of worldwide power requirements on the environment are discussed. Problems related to future power demands are analyzed. NSA

N71-14474# Eye Research Foundation of Bethesda, Md.
MEASUREMENT OF RETINAL IMAGE FOR LASER RADIATION IN RHESUS MONKEY Final Report
Marvin N. Stein and Stephen S. Elgin Feb. 1970 37 p refs
(Contract F41609-68-C-0038)
(AD-702865; Rept-7005-703f) Avail: NTIS CSCL 6/5

The techniques described were developed to corroborate the feasibility of making in vivo measurements of image parameters in the interior of the eye. The preliminary experiments on excised eyes demonstrated that the procedure for photographing the image was a reliable and valid way to record the image for detailed examination. The design of a suitable fiber optics conduit posed several difficult problems. However, it was demonstrated that the design achieved does provide a means for transmitting the information directly to an external detector and that the resolution of the system can be made sufficiently high to provide the required fidelity. The results of the in vitro experiments with excised eyes indicate that 20 micron diameter at intensity value of 1/e of maximum is probably the limiting size one can expect to find for an emetropic, light adapted rhesus monkey eye. The in vivo measurements derived from a limited number of samples resulted in values of 32 microns for a 2mm pupil and 37 microns for a 4mm pupil. Author

N71-14475# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE SCALING PROBLEM IN THE CLASSIFICATION OF IMAGES BY SPATIAL FILTERING
Richard A. Gill (M.S. Thesis) May 1970 92 p refs
(AD-712686; GA/BE-70-1) Avail: NTIS CSCL 6/4

The purpose of this investigation is to modify an existing model of the human visual system, based on the spatial filtering of the two-dimensional Fourier transform of an input stimulus, to allow for considerable scale changes in the input stimuli. The primary tool compensation, the scaling property of the Fourier transform is discussed and its application to discrete two-dimensional patterns is presented. A method for determining the scale factor of an input pattern, given some a priori information on several input patterns, is described. The scale factors derived from this method are shown to relate to the human estimation of size. A complete scaling algorithm, applicable to many pattern recognition problems, is presented. The results of two computer simulations, using this algorithm, are presented. The first simulation demonstrates the successful classification of handwritten geometric outlines, with moderate scale differences, and the second simulation shows the classification of Russian characters with scale differences of up to 3.5 to 1. These results clearly demonstrate both the need for the scaling algorithm and its effectiveness. Author (TAB)

N71-14476# Environmental Health Service, Rockville, Md.
TECHNICAL, INTELLIGENCE, AND PROJECT INFORMATION SYSTEM FOR THE ENVIRONMENTAL HEALTH SERVICE. VOLUME 1: MANAGEMENT ASSISTANCE AND PLANNING Final Report
David L. Morrison, D. B. Menzel, K. L. Nielson, A. A. Levin, C. W. Hamilton 29 Jun. 1970 104 p refs
(Contract PHS-CPS-69-005)
(PB-19441; CPS-69-005-1-Vol-1) Avail: NTIS CSCL 05A

The concepts embodied in the development and implementation of a comprehensive R and D and program planning capability for EHS were examined. Environmental stressors were selected as the basis for planning rather than categorical approaches. For the mix of complex problems encountered by EHS, a system to establish priorities is required. The integrated planning system which was recommended utilizes mathematical models to assess the impacts of technology upon man and his environment and the assignment of priorities based upon quality of life indices. A hierarchical approach to the development of mathematical models for prediction of the impacts of stressors upon man and the environment was described and specific examples are presented for lead in the environment. See also N71-14477, N71-14478, N71-14479, and N71-14480. Author (USGRDR)

N71-14477# Environmental Health Service, Rockville, Md.
TECHNICAL, INTELLIGENCE, AND PROJECT INFORMATION SYSTEM FOR THE ENVIRONMENTAL HEALTH SERVICE. VOLUME 2: EHS INFORMATION NETWORK ANALYSIS Final Report
Ralph L. Darby, Robert S. Kohn, Thomas E. Carroll, W. David Penniman, and David L. Morrison 29 Jun. 1970 147 p refs
(Contract PHS-CPS-69-005)
(PB-194411; CPS-69-005-2-Vol-2) Avail: NTIS CSCL 05B

The study for the Environmental Health Service is an investigation of the problems being faced in protecting man's environment from threats created by man. This study included the following major efforts: (1) research and development planning in the perspective of man in his total environment, (2) information network analysis, and (3) model case studies. This volume of the report concerns itself with information network analysis. An investigation was made of the existing EHS information resources including the monitoring and surveillance activities. A survey was conducted of the documentation systems and libraries in order to determine their operational characteristics as related to an information network. See also N71-14476, N71-14478, N71-14479, and N71-14480. Author (USGRDR)

N71-14478# Environmental Health Service, Rockville, Md.
TECHNICAL, INTELLIGENCE, AND PROJECT INFORMATION SYSTEM FOR THE ENVIRONMENTAL HEALTH SERVICE. VOLUME 3: LEAD MODEL CASE STUDY Final Report
Garson A. Lutz, Arthur A. Levin, Sanford G. Bloom, Kaj L. Nielsen, and Jack L. Cross 29 Jun. 1970 142 p refs
(Contract PHS-CPS-69-005)
(PB-194412; CPS-69-005-3-Vol-3) Avail: NTIS CSCL 06F

The lead model case study was undertaken to serve as a working example and to evaluate the technical, intelligence, and project information system under consideration for EHS. Occurrence and use patterns for lead within the U.S. were examined. Leaded fuels are the major source of environmental lead. Pediatric plumbism, the most significant acute health problem, arises from lead used as a pigment. The economic aspects of this problem area were investigated. A mathematical model was developed to represent the environmental transport of the stressor lead from several sources with the subsequent intake of lead by man. This model can be used to assess the impact of contemplated actions on lead body burdens, to define R and D requirements, and to identify the needs and locations for monitoring and surveillance. A categorized bibliography for lead is included. See also N71-14476, N71-14477, N71-14479, and N71-14480. Author (USGRDR)

N71-14479# Environmental Health Service, Rockville, Md.
TECHNICAL, INTELLIGENCE, AND PROJECT INFORMATION SYSTEM FOR THE ENVIRONMENTAL

HEALTH SERVICE. VOLUME 4: PESTICIDES MODEL CASE STUDY Final Report

J. K. Yoss, J. W. Blaylock, M. J. Schneider, L. C. Schwendiman, and C. J. Touhill, Jr. 29 Jun. 1970 63 p refs

(Contract PHS-CPS-69-005)

(PB-194413; CPS-69-005-4-Vol-4) Avail: NTIS CSCL 06F

DDT was selected as the compound for this study due to paucity of data regarding environmental effects of other classes of pesticides. Human exposure to pesticides was examined from two major pathways: the direct pathway which deals with direct uptake from primary sources of pesticide release, and the indirect pathway which involves human exposure by translocation through air, water, or food. Reductions in accidental poisonings could be made by limiting the total toxicant contents of home packages of pesticides, and means to reduce deaths from aerial applications warrant further study of this method of application. The control of human burden of pesticides by control of food residues is only partially effective since evidence on pesticide distribution in the environment suggests that about half of the intake is from inhalation of insecticide aerosols or dust laden with insecticides. See also N71-14476, N71-14477, N71-14478, and N71-14480.

Author (USGRDR)

N71-14480# Environmental Health Service, Rockville, Md.

TECHNICAL, INTELLIGENCE, AND PROJECT INFORMATION SYSTEM FOR THE ENVIRONMENTAL HEALTH SERVICE. VOLUME 5: DIRECTORY OF EHS INFORMATION FACILITIES WITH SELECTED SUPPLEMENTARY RESOURCES Final Report

Ralph L. Darby, Robert S. Kohn, Thomas E. Carroll, W. David Penniman, and David L. Morrison 29 Jun. 1970 70 p refs

(Contract PHS-CPS-69-005)

(PB-194414; CPS-69-005-5-Vol-5) Avail: NTIS CSCL 05A

This study is a multifaceted and intensive investigation of the problems facing the EHS in protecting man's environment from threats created by man, including the following major efforts: (1) research and development planning in the perspective of man in his total environment, (2) information network analysis, and (3) model case studies. This directory represents an inventory of information and data resources useful to the personnel of the Environmental Health Service. It is divided into three principal categories: (1) EHS-sponsored resources, (2) non-EHS resources, and (3) monitoring and surveillance activities of both the National Air Pollution Control Administration and the Environmental Control Administration. A subject-index, an index of information facilities, and an index of the parent or sponsoring organization are provided. See also N71-14476, N71-14477, N71-14478, and N71-14479.

Author (USGRDR)

N71-14481*# Techtran Corp., Glen Burnie, Md.

PHYSIOPATHOLOGICAL RESPIRATORY EVALUATION IN SUBJECTS PRACTICING UNDERWATER ACTIVITY

A. M. Ravara et al Washington NASA Dec. 1970 6 p refs Transl. into ENGLISH from Boll. Soc. Ital. Biol. Sper. (Italy), v. 45, no. 7, 1969 p 396–398

(Contract NASw-2037)

(NASA-TT-F-13424) Avail: NTIS CSCL 06S

Static and dynamic pulmonary volumetric variations observed during special breathing exercises by professional underwater workers are discussed. The conclusion reached is that underwater breathing apparatus does not cause severe damage to the diver's respiratory system.

Author

N71-14482# RAND Corp., Santa Monica, Calif.

A BRIEF SURVEY OF LITERATURE RELATING TO THE INFLUENCE OF LOW INTENSITY MICROWAVES ON NERVOUS FUNCTION

R. J. MacGregor Sep. 1970 14 p refs

(AD-712694; P-4397) Avail: NTIS CSCL 6/18

A review is provided of the behavioral, neuroelectric, and morphological effects resulting from exposure to low intensity microwave radiation.

TAB

N71-14483*# Techtran Corp., Glen Burnie, Md.

CLINICAL EVALUATION OF RHEOGRAPHY CARRIED OUT UNDER WATER ON SUBJECTS PRACTICING UNDERWATER ACTIVITY [VALUTAZIONE CLINICA DELLA REOGRAFIA EFFETTUATA IN IMMERSIONE SU SOGGETTI ESERCITANTI ATTIVITA' SUBACQUEA]

U. Fabris et al Washington NASA Dec. 1970 6 p refs Transl. into ENGLISH from Boll. Soc. Ital. Biol. Sper. (Italy), v. 45, no. 7, 1965 p 394–395

(Contract NASw-2037)

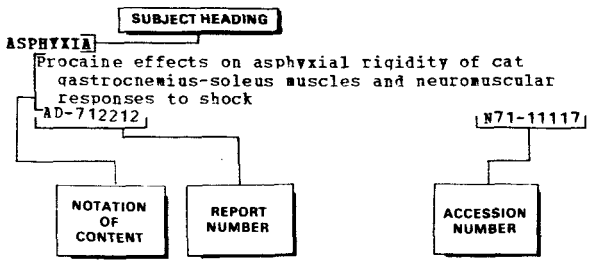
(NASA-TT-F-13423) Avail: NTIS CSCL 06P

Professional underwater workers from 20 to 45 years of age were subjected to a rheographic examination which was carried out with the subjects at about 10 meters depth with recording lasting about 10 minutes. The temperature varied from 21 C at the surface to 11 C on the bottom. The electrodes were placed on the forearm and index finger and linked to the apparatus at the surface by means of a cable.

Author

Subject Index

Typical Subject Index Listing



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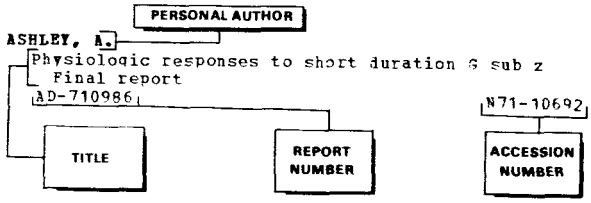

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—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

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